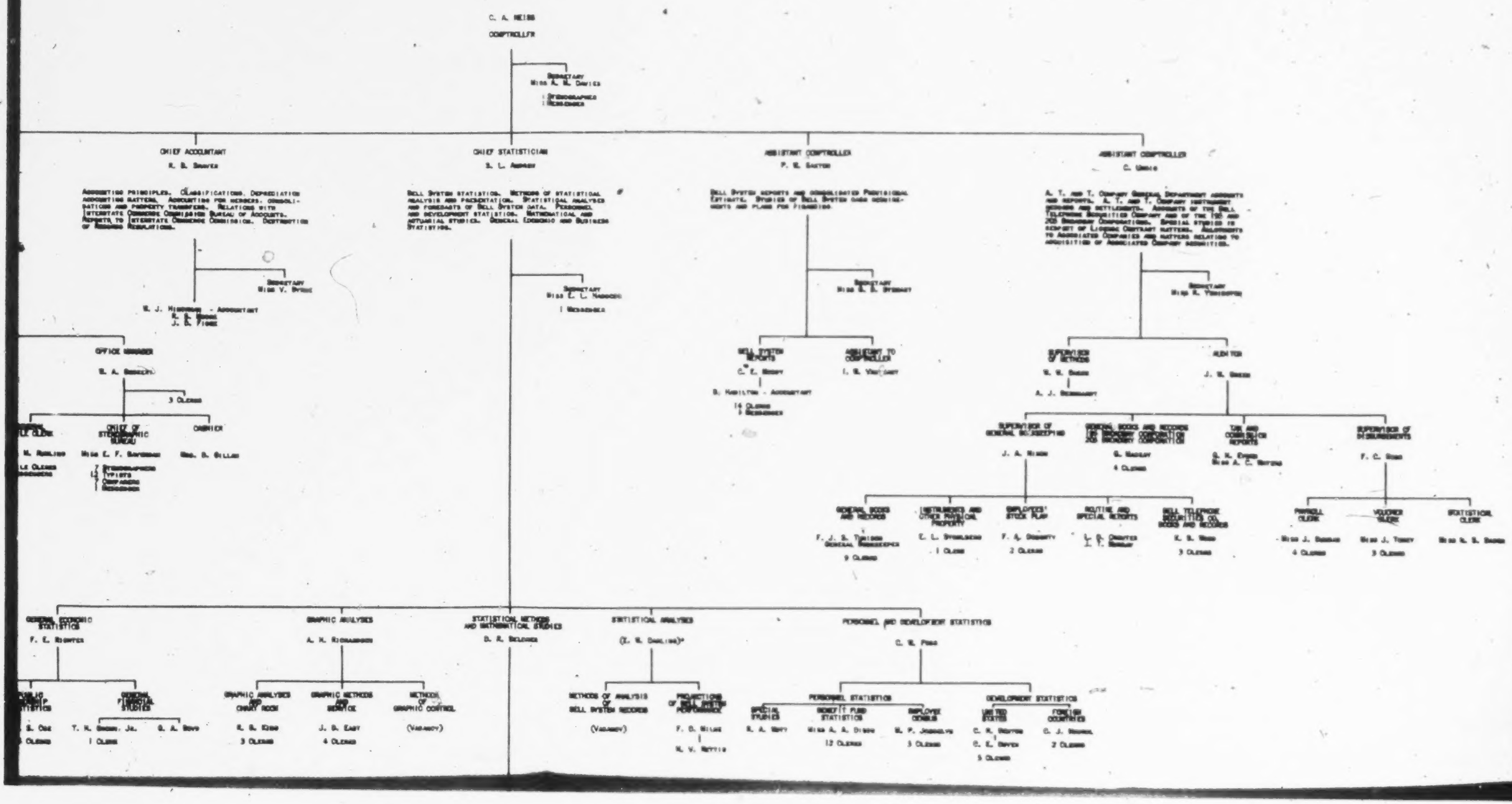
TOLL CASE CRUNDEN EXHIBIT 2

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

COMPTROLLER'S DEPARTMENT

- DECEMBER 1, 1923 -



COMPTROLLER

Secretary
Miss A. M. Davies
1 Stenographer
1 Messenger

CHIEF ACCOUNTANT
R. B. Sawyer

Accounting principles, classifications, depreciation accounting matters. Accounting for mergers, consolidations and property transfers. Relations with Interstate Commerce Commission Bureau of Accounts. Reports to Interstate Commerce Commission. Depositories of Records Regulations.

Secretary
Miss V. Dyson

R. J. Hirshman - Accountant
E. E. Grace
J. E. Fiske

OFFICE MANAGER
E. A. Bennett

3 Clerks

Chief of Statistical Bureau
Miss C. F. Sandman

7 Stenographers-Typists
Comptometer Operators
Messengers

Chapter
Mrs. D. Gillis

CHIEF STATISTICIAN
S. L. Andrew

Bell System statistics. Methods of statistical analysis and presentation. Statistical analyses and forecasts of Bell System data. Research and development statistics. Mathematical and actuarial studies. General economic and business statistics.

Secretary
Miss E. L. Hargrove
1 Messenger

ASSISTANT COMPTROLLER
F. W. Saxton

Bell System reports and consolidated Provisional Estimate. Studies of Bell System cash requirements and plans for financing.

Secretary
Miss K. E. Stewart

Bell System Reports
C. E. Moody

E. Hamilton - Accountant
14 Clerks
1 Messenger

Assistant to Comptroller
I. H. Van Sant

ASSISTANT COMPTROLLER
C. Umlo

A. T. and T. Company General Department accounts and reports. A. T. and T. Company instrument records and installments. Accounts of the Bell Telephone Securities Company and of the 195 and 205 Broadway Corporations. Special studies in respect of License Contract matters. Adjustments to Associated Companies and matters relating to acquisition of Associated Company securities.

Secretary
Miss E. Yerington

Supervisor of Methods
W. H. Rowe

A. J. Rosenquist

Auditor
J. H. Bacon

Supervisor of General Accounting
J. A. Wilson

General Books and Records of Property Companies and Property Companies
G. Mackay
4 Clerks

Tax and Commission Reports
E. M. Dyer
Miss A. C. Bryson

Supervisor of Disbursements
F. C. Ross

General Books and Records
F. J. S. Tobias
General Bookkeeper
9 Clerks

Instruments and Other Physical Property
E. L. Stoneback
1 Clerk

Employees' Stock Plan
F. A. Doherty
2 Clerks

Routine and Special Reports
L. P. Chester
J. T. Bailey

Bell Telephone Securities Co. Books and Records
E. S. Wise
3 Clerks

Payroll Clerk
Miss J. Dubbs
4 Clerks

Voucher Clerk
Miss J. Tobey
3 Clerks

Statistical Clerk
Miss M. S. Bowles

General Economic Statistics
F. E. Richter

Public Utility Statistics
S. Ost
3 Clerks

General Financial Studies
T. N. Brown, Jr.
1 Clerk

S. A. Boyd

Graphic Analyses
A. K. Richardson

Graphic Analyses and Chart Room
R. B. Kline
3 Clerks

Graphic Methods and Service
J. D. East
4 Clerks

Methods of Graphic Control
(Vacancy)

Statistical Methods and Mathematical Studies
D. R. Belcher

Analyses of Business Statistics and Correlation Studies
(E. H. Ahl)*
R. M. Flinn
7 Clerks

Fire Insurance
E. D. Read

Actuarial Analyses
S. H. Wiedbrock
O. C. Richter
3 Clerks

General Mathematical Analyses
F. B. Rabbitt
B. E. Dunlap

General Library
Miss M. Dell, Bell Librarian
3 Clerks
1 Messenger

Divisional Routine
Miss M. T. Sullivan
Chief Clerk
4 Stenographers
3 Messengers

Statistical Analyses
(E. H. Darling)*

Methods of Analysis of Bell System Records
(Vacancy)

Projections of Bell System Performance
F. O. Wilke
R. V. Reville

Personnel and Development Statistics
C. W. Pike

Personnel Statistics
Special Studies
R. A. Neff

Benefit Fund Statistics
Miss A. A. Dixon
12 Clerks

Employee Credits
M. P. Josselyn
5 Clerks

Development Statistics
United States
C. R. Boynton
C. E. Dwyer
5 Clerks

Foreign Countries
G. J. Rowell
2 Clerks

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[fol. 15315] TOLL CASE—CRUNDEN EXHIBIT 11

A. U. R. P. 124

Filed Feb. 28, 1924

American Telephone and Telegraph Company

List of Accounting Circulars and Bulletins Issued by the Comptroller's Department for the Information and Assistance of Associated Bell Telephone Companies

[fol. 15316]

Accounting Circulars

Number	Date Issued	Subject
8	1- 1-13	Standard Telephone Accounts.
8B	3- 3-13	Additions and Minor Changes.
8C	4- 8-14	" " " "
8D	6- 3-14	Employees' Benefit Fund Accounting.
8E	1-22-15	Standard Telephone Accounts (Supplementing Accounting, Circular No. 8).
8F	12-15-20	Standard Telephone Accounts (Supplementing Accounting Circular No. 8).
9	12-28-12	List of Circular No. 6 Accounts and Corresponding Circular No. 8 Accounts.
10	3-26-13	Standard Accounting Treatments.
10A	3-30-17	Standard Accounting Treatments (Supplementing Accounting Circular No. 10).
12	7- 1-16	Questions and Answers.

Accounting Bulletins

1A	5- 6-09	Accounting Bulletins.
2C	1-29-13	Field Code for Plant and Maintenance Accounts.
3C	3-29-13	Accounting for Station Equipment.
4C	10- 1-20	Estimates, Forms and Records.
5B	5-15-13	Vouchers.
6B	5-15-13	Detail Distribution.
7B	6- 3-13	Employees' Working Advances.
8B	5-15-13	Office Furniture and Fixtures.
9B	5-15-13	General Tools and Implements.
10B	5-15-13	General Stable and Garage Equipment; Stable and Garage Expense.
11B	6- 3-13	Office Supplies.
12B	5-20-13	Plant Supplies.

Accounting Bulletins—Continued

Number	Date Issued	Subject
12B-1	1- 7-14	Plant Supplies.
12B-2	12- 7-14	Plant Supplies.
12B-3	2-10-16	Plant Supplies.
13B	5- 8-13	Time Records and Payrolls.
14C	2- 8-13	Analysis of Debit Subaccounts of Reserve for Accrued Depreciation.
15D	12-28-15	Telegrams Telephoned—Class 1, 2, 3 and 11B Offices.
16D	1-23-15	Record of Officers and Certain Employees of Bell Telephone System.
17A	12-15-11	Bills Against Subscribers.
18A	12-15-11	Subscribers' Ledgers and Revenue Summaries.
19A	12-15-11	Subscribers' Final and Suspended Accounts.
20A	12-15-11	Company Attended and Automatic Public Pay Stations.
21A	12-15-11	Automatic Public Pay Stations.
22B	12-20-13	Toll Billing.
24A	12-15-11	Measured Service Billing.
[fol. 15317]		
25B	6-21-13	Telephone Service in Return for Rights and Privileges.
26B	4- 5-13	Instruments of the American Bell Telephone Company.
28B	10-15-13	Telegrams Telephoned—Class 12, 13, 14 and 15 Offices.
33A	12- 4-12	Application of Plan for Employees' Pensions, Disability Benefits and Insurance.
35A	6-25-13	Records for Instruments of the American Bell Telephone Company.
—	(Annually)	Federal Income Tax Requirements.
40A	4- 9-14	Accounting for Qualified Toll Service—Subscribing Telephone Companies.
42B	1-14-20	Application of Second Stock Purchase Plan of American Telephone and Telegraph Company for Bell System Employees.
42C	7- 1-21	Application of Employees' Stock Plan, Dated May 1, 1921.

Accounting Bulletins—Continued

Number	Date Issued	Subject
42C-1	4-15-22	Supplementing Accounting Bulletin 42C.
43A	12-29-15	Financial Department Records.
43A-1	2-28-16	" " " —Bond Coupon Records.
44A	5- 6-16	Protection of Toll Revenue.
45B	4- 7-17	Military and Naval Service.
47A	6-11-17	Records of Securities.
48A-4	5-19-19	Victory Liberty Loan Notes.
49B	8-14-19	United States Government Tax on Telephone Messages and Special Facilities.
50A	6- 6-18	Company Custody of Employees' Liberty Loan Bonds.
51A	1- 1-20	Uncollected Toll Charges at Public Telephone Stations.
52A	12-15-20	Overhead Expense.
53A	5-15-21	Auditing and Recording Cash Collections and Deposits.
54A	1- 1-22	Settlement Summaries and Statements for Long Lines Toll Revenue.
102B	5- 8-11	Standard Forms—Bell Telephone System.
103B	12-31-12	Standard Station Classifications.
104A	12-31-10	Standard Definitions.
104A-1	3-15-11	Standard Definitions.
104 -2	3- 7-12	Standard Definitions (Minor Changes).
105C	5-18-17	Mailing or Delivering Subscribers' Bills.
107A	1-16-12	Typical Organization of an Accounting Department in a Large Operating Telephone Company.
108A	9- 1-17	Standard Occupational Classification of Telephone Employees.

[fol. 15318]

Accounting Letters

Index of Titles—"A" Letters

A- 1	1-18-22	Compilation of Reports to Interstate Commerce Commission.
A- 2	3- 6-22	Accounting for Revenues and Expenses in connection with Property carried in Account 111—Miscellaneous Investments.

Index of Titles—"A" Letters—Continued

Number	Date Issued	Subject
A- 3	6-12-22	Accounting for Credits issued by Western Electric Co., Inc., on freight claims allowed by carriers on overcharged shipments.
A- 4	6-21-22	Classification as between Construction and Operation of Commercial Department Expenditures on Commercial Surveys.
A- 5	6-28-22	Period of time after which certain Expenditures for construction carried in Account 104—Construction Work in Progress, must be cleared from that account.
A- 6	8- 2-22	Account 707-08 House Service Expense—Special Rearrangements.
A- 7	8- 4-22	Accounting for Expenditures Chargeable to Account 104—Construction Work in Progress.
A- 8	11-22-22	Classification of Pay and Expenses of Chief Traveling Auditor and Traveling Auditors.
A- 9	11-23-22	Enclosing letter regarding Accounting for Toll Commissions and for Certain Facilities and Services furnished by one Company to another.
A-10	12- 7-22	Accounting for Expenditures incurred in connection with Public Switchboard Demonstrations.
A-11	2-14-23	Accounting for Amounts received for space leased to Others in Building partly Occupied by the Telephone Company when House Service is Furnished.
A-12	3-29-23	Accounting for Investment and Expenses in connection with Public Address System Equipment and Radio Broadcasting Equipment.
A-13	5-21-23	Accounting for Commercial Department Cash Overages and Shortages.
A-14	9-27-23	Accounting for Revenues Subject to Possible Refund Pending Rate Investigations.

Index of Titles—"A" Letters—Continued

Number	Date Issued	Subject
A-15	10-29-23	Classification of Cost of Inspection of Plant.

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A-16	11-22-23	Accounting for Going or Completed Plants Purchased.
A-17	1-23-24	Pricing of Non-Standard Reusable Material Returned to Class "C" Stock.
A-18	2- 5-24	Classification of Cost of Removing Drop Wires.

[fol. 15320] Index of Titles—"M" Letters

M- 1	1-19-22	Method for Establishing and Maintaining Reserve for Uncollectible Accounts.
M- 1-1	10-20-22	Uncollectible Operating Revenues. (See "M"-8.)
M- 2	1-19-22	Accounting Stub Plan—Filing Equipment. (See "M"-16.)
M- 3	1-20-22	Review of Burglary and Hold Up Insurance—Bell System.
M- 4	2-14-22	Elimination of Stamps—First Class Mail.
M- 4-1	4-26-22	Postage Meter Machines—"Statement of Mailing" Registers.
M- 5	2-14-22	Accounting procedure involved in Standard Commercial Practice relating to Service Orders. Billing and Collections for Telephone Service to U. S. Army.
M- 5-1	6-26-22	Accounting procedure involved in Standard Commercial Practice relating to Service Orders. Billing and Collections for Telephone Service to U. S. Army.
M- 6	2-15-22	Ventilation of Offices.
M- 7	2-21-22	Binders for Controlling Records.
M- 8	3- 6-22	Uncollectible Long Lines Toll Messages.
M- 9	2-21-22	Subscribers' Bills—Fractional Charges and Credits.

Index of Titles—"M" Letters—Continued

Number	Date Issued	Subject
M- 9-1	10-30-22	Subscribers' Bills—Fractional Charges and Credits.
M-10	2-23-22	Controlling Records—Transferred Accounts.
M-11	3- 7-22	Elimination of Stamps—First Class Mail.
M-12	4-17-22	Telephone Subscribers' Bills—Standardization of Paper Stock and Perforations.
M-13	5- 6-22	Reporting U. S. Tax on Telephone Messages.
M-14	5-15-22	Mailing Subscribers' Bills as Third Class Matter.
M-15	5-23-22	Abbreviations for Toll Purposes.
M-15-1	7- 5-23	Abbreviations of Cities and Towns for Toll Work.
M-16	5-23-22	Accounting Stub Plan Equipment—Guide Cards.
M-17	5-31-22	Correction of Collect Tickets.
[fol. 15321]		
M-18	6- 9-22	Method of Preparing Standard Commercial Department Collection Report.
M-18-1	11-10-22	Commercial Department Collection Report.
M-19	6- 1-22	Assignment of Form Numbers.
M-20	6-19-22	Fidelity Bonds—Reduction in Rates.
M-21	6-27-21	Changes in Application of Report Charges.
M-22	7- 3-22	Telegrams Telephoned.
M-23	7-10-22	Messenger Service Revennes.
M-24	7-28-22	Overcharges on Freight Shipments of Telephone Material.
M-25	8- 1-22	Methods of Checking W. E. Bills and Credits.
M-25-1	1- 2-23	Methods of Checking W. E. Bills and Credits.
M-26	8-10-22	Method of Estimating Unbilled Additional Local Message Revenue (Monthly Settlement Plan).

Index of Titles—"M" Letters—Continued

Number	Date Issued	Subject
M-27	8-21-22	"Equated Production Unit" Method of Measuring Revenue Accounting Costs.
M-27-1	4-25-23	Analysis of Revenue Accounting Costs.
M-27-2	8- 8-23	Analysis of Revenue Accounting Costs.
M-28	8-23-22	Estimated Toll Service Revenues.
M-29	9-22-22	Retirement Unit Costs for Station Equipment.
M-30	10-27-22	Standard Controlling Records and Summaries.
M-31	12- 7-22	Telephone Subscribers' Bills and Envelopes—Recommended Standards.
M-31-1	1-25-24	Telephone Subscribers' Bills.
M-32	11-14-22	Accounting Department Record of Important Transactions.
M-33	12- 9-22	Estimate of Intercompany Toll Settlements—Receivables and Payables.
M-34	3- 6-23	Accounting Circular 8F and Accounting Bulletin 52A—Overhead Expense.

[fol. 15322]

M-35	4- 6-23	Preparation of Addressograph Plates.
M-36	5- 1-23	Recording and Accounting for Subscribers' Deposits.
M-37	5-15-23	Measured Service and Billing.
M-38	7-18-23	Coin Box Public Pay Station Accounting.
M-39	9-14-23	Toll Billing—Record of Tax Register Readings.
M-39-1	9-24-23	Toll Billing—Equipment and operation of Toll Billing Typewriters.
M-39-2	12- 6-23	Toll Billing Desks.
M-39-3	1-23-24	Toll Billing—Proper Cutting of Toll Service Statements.

(Here follows 1 paster, side folio 15323)

[Vol. 15323]

TOLL CASE—CRUNDEN EXHIBIT 12

Illustration of Method of Determining Annual Depreciation Expense

Class of Property (1)	Cost (2)	Average Service Life Years (3)	Gross Salvage (4)	Cost of Removal (5)	Net Salvage Amount (6)	Net Salvage % of Col. 2 (7)	Property Cost Used Up Amount (Col. 2 − Col. 6) (8)	Property Cost Used Up % of Col. 2 (9)	Annual Depr. Rate Per Cent (Col. 9 + Col. 3) (10)	Annual Depreciation Expense (Col. 2 × Col. 10) (11)
Buildings	$82,000	25	$28,700	$.....	$28,700	35	$53,300	65	2.6	$2,132
Central Office Equip	196,000	10	47,040	7,840	39,200	20	156,800	80	8.0	15,680
Station Apparatus	78,000	4	23,400	.....	23,400	30	54,600	70	7.5	5,850
Private Branch Exchanges	32,000	8	12,800	1,600	11,200	35	20,800	65	8.1	2,592
Booths	4,000	11	680	200	480	12	3,520	88	8.0	320
Exchange Pole Lines	67,000	10.5	.....	.....	.....	0	67,000	100	9.5	6,365
Exchange Aerial Cable	64,000	13	24,320	6,400	17,920	28	46,080	72	5.5	3,520
Exchange Aerial Wire	53,000	11	.....	.....	.....	0	53,000	100	9.0	4,770
Exch. Underground Conduit	82,000	42	.....	.....	.....	0	82,000	100	2.4	1,968
Exch. Underground Cable	110,000	18.5	55,000	16,500	38,500	35	71,500	65	3.5	3,850
Exch. Submarine Cable	1,300	10	.....	.....	.....	0	1,300	100	10.0	130
Toll Pole Lines	75,000	16	.....	.....	.....	0	75,000	100	6.0	4,500
Toll Aerial Cable	10,000	14	4,500	1,500	3,000	30	7,000	70	5.0	500
Toll Aerial Wire	77,000	19	34,650	16,170	18,480	24	58,520	76	4.0	3,080
Toll Underground Conduit	9,000	50	.....	.....	.....	0	9,000	100	2.0	180
Toll Underground Cable	19,000	25	10,450	3,420	7,030	37	11,970	63	2.5	475
Toll Submarine Cable	1,000	10	.....	.....	.....	0	1,000	100	10.0	100
Furniture and Fixtures	7,000	10	.....	.....	.....	0	7,000	100	10.0	700
Shop Equipment	100	10	.....	.....	.....	0	100	100	10.0	10
Store Equipment	600	10	.....	.....	.....	0	600	100	10.0	60
Garage Equipment	8,000	4	1,600	.....	1,600	20	6,400	80	20.0	1,600
Tools and Implements	4,000	4	800	.....	800	20	3,200	80	20.0	800
Right of Way—Exchange	5,000	16	.....	.....	.....	0	5,000	100	6.0	300
Right of Way—Toll	7,000	33	.....	.....	.....	0	7,000	100	3.0	210
Interest During Constr	8,000	..	.....	.....	.....	..	8,000	100	6.0	480
Total	$1,000,000		$243,940	$53,630	$190,310	..	$809,690			$60,172

—Composite Rate—

(A) Total Investment $1,000,000.

(B) Total Annual Depre. Expense $60,172.

(C) Composite Depreciation Rate (B + A) 6.017%.

[fol. 15324] TOLL CASE—KOSITZKY EXHIBIT No. 2

The Ohio Bell Telephone Company

Services Rendered to the Ohio Bell Telephone Company by the General Staff of the American Telephone and Telegraph Company

A—List of General Engineering Circulars—Side folios 15324 to 15425.

B—List of Specifications, Including 91 that are in Handbook Form—Side folios 15426 to 15455.

C—List of Commercial Circulars—Side folios 15456 to 15458.

D—List of Traffic Circulars—Side folios 15459 to 15467.

A—List of General Engineering Circulars

1 Central Office Equipment.
2 No. 25 Repeating Coil.
(June 6, 1905)
3 Wiring of Desk Stands.
4 Development Plans for Small Cities.
(Replaced by G. E. C. 297)
5 Transmitting "Notes on Exchange Construction."
6 Transmitting Specifications for Forty Wire Pole Line.
(Replaced by G. E. C. 46)
7 Thickness of Sleeves for Cable Splicing.
8 100-Line Automatic Exchange—Charging over trunks.
9 Joint Conduits.
10 High Potential Protectors.
11 Rock Elm Pins as Substitute for Locust.
(Replaced by G. E. C. 613)
12 Multipling Small Cable Terminals.
13 Mercury Arc Rectifier.
(Replaced by G. E. C. 85)
14 Lead Sleeves.
15 Exchange Distribution—Number and Location of Aerial Cable Terminals.
16 Specifications for Underground Construction.
(Replaced by G. E. C. 261)
17 Cable Plans for Small Cities.

[fol. 15325]

18 No. 14 Cable Terminals.

19 600-Pair No. 22 Brown and Sharpe Gauge Cable.
(Replaced by G. E. C. 202)

20 Outside Distributing Wire.
(Replaced by G. E. C. 194)

21 Galvanized Steel Strand.
(Supplemented by G. E. C. 37)

22 Relay Switchboard No. 10.
(Supplemented by G. E. C. 35)

23 Transmitting Notes on Rural Lines.
(Replaced by G. E. C. 263)

24 Specifications for Creosoted Wood Duct and Plank.
(May 17, 1906)
(Supplemented by G. E. C. 180 and 986)

25 Items of Equipment which Affect Transmission.
(Supplemented by G. E. C. 39)
(Replaced by G. C. 51)

26 Handbook of Telephone Substation Circuits—Additional Sheets.

27 Jack Markings.
(Supplemented by G. E. C. 62)
(Replaced by G. E. C. 66)

28 Multiple No. 4 Private Branch Exchange Switchboard.
(Replaced by G. E. C. 307)

29 Residence System No. 1.
(July 30, 1906)

30 Apartment House System No. 1.

31 Private Branch Exchange No. 2.
(August 1, 1906)

32 Slotted Lamp Sockets Mountings.

33 Specifications for Underground Construction.
(Replaced by G. E. C. 261)

34 Economy in Subway Construction.
(Replaced by G. E. C. 261)

35 No. 10 Switchboard.
(Supplementing G. E. C. 22)

36 No. 2 Toll Board.
(Preliminary)
(Replaced by G. E. C. 48)

[fol. 15326]

37 Galvanized Steel Strand.
(Supplementing G. E. C. 21)

38 High Potential Protection.

39 Use of Phantomed Circuits on Built up Connections.
(Supplementing G. E. C. 25)
(Replaced by G. C. 51)

40 Specifications for 12 or 20 Wire Line.
(Replaced by G. E. C. 674)

41 Preservative Treatment of Poles.
(Supplemented by G. E. C. 56 and 365)

42 Conduit Plans.

43 Phantom Circuits.
(Replaced in part by Specifications 3103 and 3120)

44 Iron Wire.

45 Wiring of Telephone Switchboard Lighting Circuits.
(January 16, 1907)
(Replaced in part by G. E. C. 124 and 166)

46 Specifications for 40 to 80 Wire Pole Lines.
(Replacing G. E. C. 6)

47 Insulation Joints in Lead Cable Sheaths.
(Replaced by G. E. C. 630)

48 No. 2 Toll Board.
(Replacing G. E. C. 36)

49 Jack per Station.
(January 29, 1907)

50 Transmitting Report—"The Use of Pole Changers in Central Offices".

51 Aerial Cable Hangers.

52 Cable Records.

53 Height of Wall Sets.
(March 9, 1907)

54 Protection—Street Railway and Electric Power Co's. Telephone System.
(March 13, 1907)
(Replaced in part by G. E. C. 462)

55 Transmittting Specifications for Conduit Construction.
(Replaced by G. E. C. 261)

[fol. 15327]

56 Preservative Treatment of Poles.
(Supplementing G. E. C. 41)
(Supplemented by G. E. C. 728)

57 Notes on Development Studies.
(Replaced by G. E. C. 297)

58 Specifications for 6-Wire, 22 Foot Pole Line.
(Replaced by G. E. C. 674)

59 Cable Relief.

60 Transmitting "Notes on Cable Plans".

61 Slotted Lamp Socket Mountings.
(October 10, 1907)

62 Jack Markings.
(Supplementing G. E. C. 27)
(Replaced by G. E. C. 66)

63 Reversing Plugs.

64 Economies in Concrete Work.
(Replaced by G. E. C. 261)

65 Dry Batteries.

66 Jack Markings.
(May 22, 1908)
(Replacing G. E. C. 27 and 62)

67 New Tinsel Switchboard Cord.
(Replaced by G. E. C. 275)

68 Cable Pulley.

69 Modifications in No. 17-A Test Set.
(Supplemented by G. E. C. 483)

70 Use of Repeating Coils in Toll Cord Circuits for Reducing Noise on Through Toll Connections.
(Replaced by G. E. C. 229)

71 Arrangement of Keyboard Lamp Caps and Guards.
(Supplementing T. C. 2)
(Replaced by G. E. C. 79)

72 "A" and "B" Supervisors' Equipment.
(Supplementing T. C. 1)
(Supplemented by T. C. 17)
(Replaced by G. E. C. 264)

[fol. 15328]

73 Standard Lengths for Three-Conductor Switchboard Cords.
(Replaced by G. E. C. 77)

74 Central Office Records.

75 New Terminal Marking for Toroidal Repeating Coils.
(August 29, 1908)

76 Rural Line Subscribers' Set.
(Supplemented by G. E. C. 92 and 131)

77 Standard 3-Conductor Switchboard Cords.
(Replacing G. E. C. 73)
(Supplemented by G. E. C. 83)
(Replaced by G. E. C. 275)

78 Phantoming Pole Pairs.
(November 30, 1908)

79 Arrangement of Keyboard Lamp Caps, Guards and Cords.
(November 9, 1908)
(Replacing T. C. 2 and G. E. C. 71)
(Supplemented by G. E. C. 199, 540 and 806)
(Replaced in part by G. E. C. 476, 540 and 806)

80 Color Scheme for Desk Stand Cords.

81 Morse Secret Sounder No. 94361.

82 Rock Elm Pins.
(Supplemented by G. E. C. 110)
(Replaced by G. E. C. 613)

83 No. 346 and No. 347 Tinsel Switchboard Cords.
(Supplementing G. E. C. 77)
(Supplemented by G. E. C. 87)
(Replaced by G. E. C. 275)

84 Answering Jack Number Plates.
(September 22, 1909)
(Supplemented by G. E. C. 286)

85 Mercury Arc Rectifier.
(Replacing G. E. C. 13)
(Replaced by G. E. C. 542)

86 No. 17 Cable Terminals.

87 No. 346 and No. 347 Tinsel Cords.
(Supplementing G. E. C. 83)
(Replaced by G. E. C. 275)

88 Transmitter Attachment—"Telephone Noise Eliminator".

89 No. 4 Private Branch Exchange.
(Replacing in part S. C. 8) (Supplementing S. C. 11)
(Replaced by G. E. C. 307)

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90 Color Scheme for Desk Stand Cords.
(January 26, 1910)

91 Emergency Arrangements—Call Circuits and Trunks.
(Replaced by G. E. C. 144)

92 Rural Line Subscribers' Sets.
(March 15, 1910)

93 Copper-Steel Outside Distributing Wire.
(Supplemented by G. E. C. 136 and 139)
(Replaced by G. E. C. 285)

94 Lead Sleeves.
(Replaced by G. E. C. 543)

95 No. 71-A Heat Coil—Pull-out Type.

96 Joints in Iron Wire.
(Supplemented by G. E. C. 603)

97 Test for Desk Stand Cord Connections.
(April 29, 1910)

98 New Tinsel Cords for Toll Purposes.
(Replaced by G. E. C. 275)

99 Rural Line Subscribers' Sets.
(Supplementing G. E. C. 92)

100 Mine Telephone.
(Replacing G. C. 39)

101 Comparative Economies in the Use of Gas and Electricity for Charging Batteries in Telephone Exchanges.
(July 11, 1910)

102 New Standard Trunk Section.
(Replaced by G. E. C. 548)

103 (Never Issued).

104 Central Office Building Plans.

105 New Retardation Coils for Composite and Duplex Sets.

106 Substitution of No. 67 and No. 69 Heat Coils for No. 41 and No. 4-A Heat Coils.
(Replaced by G. E. C. 578)

107 Aerial Loading and Duplex Cable.
(Replaced in part by G. E. C. 253)
(Supplemented by G. E. C. 311)

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108 Proposed New Type of Prepayment Multi-Coin Box.
(Replaced in part by G. E. C. 217)
(Supplemented by G. E. C. 328 and 411)

109 Method of Adding Plates to Storage Batteries.
(September 9, 1910)

110 Creosoted Rock Elm Pins.
(Supplementing G. E. C. 82)
(Replaced by G. E. C. 613)

111 Standard Lengths for Desk Stand Cords.

112 Operator's Transmitter No. 234.

113 High Resistance Transmitters on Local Battery Lines.
(September 26, 1910)

114 No. 49 Type Alarm Fuses.

115 Transmitting Preliminary Draft of Specifications No. 3269 for the Construction of Twenty, Ten and Two Wire Pole Lines.
(Preliminary)
(Supplemented by G. E. C. 674)

116 Abandonment of No. 14-A (10 Pair) Cable Terminal.

117 Protective Coatings for No. 14 Cable Terminals.
(October 29, 1910)

118 Ground Clamps.
(Supplementing G. C. 73)
(Replaced by G. E. C. 155)

119 Worn Plugs and Jacks.
(November 17, 1910)
(Supplemented by G. E. C. 206 and 374)

120 Use of Lock Nuts in No. 14 Cable Terminals.

121 Specifications for Single Armored Submarine Cables With Large Conductors.
(Replaced by G. E. C. 164)

122 Chestnut Guy Stubs.
(December 8, 1910)

123 Telephone Central Office Power Machines and Accessories.
(Supplemented by G. E. C. 367)
(Replaced in part by G. E. C. 511)
(Replaced by G. E. C. 745)

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124 Switchboard Lighting.
(February 7, 1911)
(Replacing in part G. E. C. 45)
(Supplemented by G. E. C. 140, 166, 482 and 726)

125 Fahnestock Test Connector.

126 Standard Substation Cords.
(December 12, 1910)

127 Measuring Instrument—Evershed Megger.
(December 13, 1910)

128 Concrete-Steel Reinforcement for Poles.
(Supplementing G. C. 81 and 90)
(Supplemented by G. E. C. 241)
(Replaced by G. E. C. 451)

129 Improved Single Pulley Switchboard Cord Weight.
(January 6, 1911)
(Supplemented by G. E. C. 196)

130 Blackburn Ground Clamp with Copper Shoe Fastened to Band.
(January 17, 1911)
(Supplemented by G. E. C. 218)

131 Modifications in Standard Magneto Subscribers' Sets.
(Supplementing G. E. C. 76 and 92)

132 No. 1-B Telegraph Set.
(Replaced by G. E. C. 673)

133 No. 20 Instrument Wire.

134 Signal Plugs.
(January 26, 1911)

135 List of Standard Specifications.
(Replaced by G. E. C. 336)

136 Transmission Efficiency of Copper-Steel Outside Distributing Wire.
(February 3, 1911)

137 Number Plate for Operators' Telephone Sets.
(February 17, 1911)
(Supplementing T. C. 18)

138 Revised Draft of Specifications No. 3235 for Exchange Aerial Construction.
(Preliminary)

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139 Copper-Steel Outside Distributing Wire.
(Supplementing G. E. C. 93)
(Replaced by G. E. C. 285)

140 Switchboard Lighting.
(February 21, 1911)
(Makes Correction in G. E. C. 124)

141 Tool for Cleaning Switchboard Jacks—No. 8 Switchboards.
(March 3, 1911)

142 Changes in No. 17 Cable Terminals.
(Preliminary)
(Supplemented by G. E. C. 309)

143 Copies of Printed Handbooks to be Obtained through the Western Electric Company.

144 Emergency Call Circuits and Emergency Local Ringdown Trunks.
(April 3, 1911)
(Replacing G. E. C. 91)
(Replaced in part by G. E. C. 548 and 647)

145 Standard Lengths for Desk Stand Cords.

146 New Toll Switchboard Cord Circuits.
(March 29, 1911)
(Supplemented by G. E. C. 430)

147 Change in No. 229 Transmitters.
(March 31, 1911)

148 Color Scheme for Desk Stand Cord—Explanatory Sheets for the Handbook of Telephone Substation Circuits.

149 No. 11 and No. 12 Protector Micas.
(April 7, 1911)

150 Cable Suspension Clamps.
(Supplemented by G. E. C. 168)

151 Composite Set Rack.
(April 12, 1911)

152 No. 49 Type Alarm Fuses.
(April 6, 1911)
(Replacing G. C. 74)
(Supplemented by G. E. C. 1069)

153 Bulletin No. 17, Storage Batteries—Obtaining Copies in Considerable Quantities.
(Supplementing G. C. 44)
(Replaced by G. E. C. 539)

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154 Discontinuing the Manufacture of No. 11 Repeating Coils.
(Supplemented by G. E. C. 280)

155 Vogel Ground Clamps.
(Replacing G. E. C. 118)

156 New Types of Call Wire Trunk Circuits.
(April 17, 1911)

(Supplemented by G. E. C. 199)

157 Improved Two-Conductor Switchboard Cord.
(Supplemented by G. E. C. 207)
(Replaced in part by G. E. C. 463)

158 Specifications for Vitrified Clay Conduit.
(April 25, 1911)

159 Specifications for Dead Oil of Coal Tar.
(Replaced by G. E. C. 517)

160 Specifications for Exchange Line Glass Insulators.

161 Galvanized Corner Bridle Rings.
(May 3, 1911)

162 No. 157 Receiver.
(May 8, 1911)

163 Revision of Color Group Scheme for Cables.

164 Revised Specifications for Single and Double Armored Submarine Cable.
(Replacing G. E. C. 121)
(Replaced by G. E. C. 573)

165 Revised Specifications No. 3235 for Exchange Aerial Construction.
(Replacing E. C. 21 and G. C. 89)
Supplemented by G. E. C. 257)

166 Toll Switchboard Lighting.
(May 25, 1911)
(Replacing in part G. E. C. 45)
(Supplementing G. E. C. 124)
(Supplemented by G. E. C. 482 and 726)

167 Myers Break Finder.

168 Galvanized Bolts for Cable Suspension Clamps.
(Supplementing G. E. C. 150)
(Replaced by G. E. C. 179)

169 Tracers for Insulated Wire Used in the Outside Plant.
(Replaced by G. E. C. 285)

170 Tool for Grooving Multiple Jacks.
(July 3, 1911)

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171 Auxiliary Night Alarm Circuit for Small Offices.
(July 24, 1911)

172 Typographical Errors—Specifications No. 2877.

173 Substation Number and Instruction Plates.
(Supplemented by G. E. C. 369)

174 Small Magneto Switchboards.
(July 26, 1911)
(Supplemented by G. E. C. 565 and 747)

175 Protection of Receiver Pole Pieces.
(July 28, 1911)

176 Change in Rating of Apparatus Described in the Western Electric Company's Card Catalogues.
(July 31, 1911)

177 Standard Traffic Engineering Methods for Use in Connection with Building Plans.
(July 27, 1911)
(Supplemented by G. E. C. 644)

178 Specifications for Exchange Aerial Construction—Correction.
(Supplementing Specifications 3235)

179 Specifications for Bolts for Cable Suspension Clamps.
(August 18, 1911)
(Replacing G. E. C. 168)

180 Specifications No. 3352 and No. 3385—Creosoted Wood Conduit. Galvanized Sheet-Iron Cable Shield.
(August 18, 1911)
(Supplementing G. E. C. 24)
(Supplemented by G. E. C. 986)

181 Crosstalk Tests.
(August 29, 1911)

182 Protection for Employees in Case of Fire.
(August 24, 1911)
(Supplemented by T. C. 50 and G. E. C. 783)

183 Information on Loading.

184 Revised Specifications No. 3293 for Transposing Single and Phantom Circuits and Dead Ending Wires at Test and Terminal Poles. Each Wire Attached to a Separate Insulator.
(Supplemented by G. E. C. 431 and 444)

185 Change in Open Space Cut-out Equipment of No. 61 Type Protectors.
(September 7, 1911)

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186 Unit Type Protector Bars for Main Distributing Frames.
(September 15, 1911)
(Replaced in part by G. E. C. 385)

187 Specifications for Western White Cedar Poles.
(September 15, 1911)
(Replacing E. C. 7 and 12)

188 Extra Glass Jars for Storage Battery Equipments.

189 Switchboard Platforms and Operators' Chairs.
(September 28, 1911)
(Supplemented by G. E. C. 447, 548, 589 and 1002)

190 Bridle Wire Electrose Insulators.

191 Portable Composite Sets.
(October 3, 1911)

192 Phantoming of Rural Subscribers' Lines.
(September 29, 1911)
(Replaced in part by G. E. C. 371)

193 Exchange Aerial Construction—Specifications No. 3235.
Error in Diagram No. 48
(Supplementing Specifications 3235)

194 No. 14 B & S Outside Distributing Wire.
(Replacing G. E. C. 20)
(Replaced by G. E. C. 616)

195 Improved Cordless Private Branch Exchange Switchboards.
(October 10, 1911)
(Supplemented by G. E. C. 577)

196 No. 116 Cord Weights.
(October 19, 1911)
(Supplementing G. E. C. 129)

197 Specifications for Bridle Wire.
(Replaced by G. E. C. 616)

198 Modifications in Present Type Cordless Private Branch Exchange Switchboards.
(Supplementing G. E. C. 195)
(Replaced by G. E. C. 577)

199 Color Scheme for Ringing Key Buttons and Plug Shells with Mechanically Locking Key Trunks.
(November 6, 1911)
(Supplementing G. E. C. 79 and 156)

200 Reversite Circuit Breakers for No. 1 Power Plants.
(November 13, 1911)

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201 Methods of splicing No. 10 B & S and No. 13 B & S Gauge Cable Conductors.
(Replaced by G. E. C. 702)

202 A: Most Economical Sizes of Cable to Install Underground.
B: Provision of Stubs for Branch from Large Cables.
(Replacing G. E. C. 19)

203 Transmitting Specifications for High Tension Crossings.
(Supplemented by G. E. C. 469 and 528)
(Replaced by G. E. C. 785)

204 Protective Coating for No. 14 Cable Terminals.
(Supplementing G. E. C. 117)
(Supplemented by G. E. C. 454)
(Replaced by G. E. C. 536)

205 Redesign of No. 103 Plug.
(November 24, 1911)

206 Jack Spring Adjusting Tools.
(December 4, 1911)
(Supplementing G. E. C. 119)

207 Standard Lengths for No. 421 Switchboard Cord.
(Supplementing G. E. C. 157)
(Replaced in part by G. E. C. 463).

208 Use of Message Registers.

209 Specifications for Insulating Sealing Compound.
(December 2, 1911)
(Supplemented by G. E. C. 230)

210 New Material Specifications.
(Supplemented by G. E. C. 613)

211 Catalogue of the American Bell Telephone Companies' Instruments.
(December 7, 1911)

212 Standard Lengths for Operators' Telephone Cords.
(December 12, 1911)

213 Specifications for Wood Preservatives.
(Supplemented by G. E. C. 508 and 512).
(Replaced by G. E. C. 581)

214 Modified Nos. 35, 36, 37 and 51 Terminal Strips.
(December 14, 1911)
(Supplemented by G. E. C. 299)

215 Color of Cords and Shells for Test and Plugging Up Lines.
(December 20, 1911)
(Supplemented by G. E. C. 540)

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216 Specifications for Pothead Wire.
(January 9, 1912)
(Replacing G. C. 58)

217 Proposed New Type of Prepayment Multi-Coin Box.
(December 29, 1911)
(Replacing in part G.E.C. 108)
(Supplemented G.E.C. 328 and 411)

218 Blackburn Ground Clamp with Copper Shoe Attached to Band.
(January 5, 1912)
(Supplementing G.E.C. 130)

219 Prices for Materials for Estimating Purposes.
(January 8, 1912)

220 Change in Polar Duplex Set.
(Replaced by G.E.C. 439)

221 Automatic Switch for Electrolysis Drainage Wires.
(January 19, 1912)

222 Specifications for Solder.
(January 31, 1912)
(Supplemented by G.E.C. 780)

223 Antimony Alloy Sheath for Underground Cables.
(January 22, 1912)
(Supplemented by G.E.C. 325)

224 Steel Pins for Porcelain Insulators.
(Replaced by G.E.C. 402)

225 All Metal Flush Type Hotel Sets.
(February 2, 1912)
(Replacing in part S.C. 27)

226 Strain Insulators.

227 Specifications for Creosoted Yellow Pine Crossarms.
(February 16, 1912)
(Supplemented by G.E.C. 583 and 775)

228 Standard Equipment for Handling Telephoned Telegrams and Private Exchange Traffic at Western Union Offices.
(February 23, 1912)
(Supplemented by G.E.C. 302)

229 Use of Repeating Coils in Toll Cord Circuits for Reducing Noise on Through Toll Connections.
(February 21, 1912)
(Replacing G.E.C. 70)

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230 Superior Western Electric Compound.
(February 28, 1912)
(Supplementing G.E.C. 209)

231 Fire Insurance.
(February 28, 1912)

232 Private Branch Exchange Switchboard No. 5.
(Preliminary)
(Replaced by G.E.C. 582)

233 New Standard Toll Test Board No. 4.
(Supplemented by G.E.C. 599)

234 Weatherproof Iron and Steel Wire.

235 Street Railway Telephones.
(Supplemented by G.E.C. 445)

236 Answering Jack Number Plates with Engraved Special Designations.
(March 26, 1912)

237 Porcelain Knobs.

238 Use and Disposition of Non-Standard Material.
(April 12, 1912)

239 Underground Conduit—Duct Requirements on Fundamental Plans.
(April 8, 1912)

240 Revision of Methods for Locating Transposition Poles.
(Preliminary)
(Replaced by G.E.C. 563)

241 Pole Butt Reinforcements.
(Supplementing G.C. 81 and 90 and G.E.C. 128)

242 Cordless Private Branch Exchange Switchboard—Omission of Condensers.
(Supplementing G.E.C. 195)
(Replaced by G.E.C. 577)

243 Moistureproof Compound for Switchboard Wire.
(Replaced by G.E.C. 368)

244 Specifications for Fir Crossarms.
(Supplemented by G.E.C. 583)
(Replaced in part by G.E.C. 708)

245 Metal Subscribers' Sets.
(May 1, 1912)

246 Gauge for Testing Individual Dry Cells in Talking and Ringing Batteries.
(April 29, 1912)
(Replacing G.C. 71)
(Supplemented by G.E.C. 748)

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247 Transmission Equivalents.
(May 2, 1912)
(Supplemented by G.E.C. 418, 419 and 484)
(Replaced in part by G.E.C. 418)

248 Normally Open Telephone Booths—Folding Door Type
(May 8, 1912)
(Supplemented by G.E.C. 291 and 407)

249 No. 250 Transmitter with Steel Arm.
(May 10, 1912)
(Replacing G.C. 45)

250 Standard Switchboard and Circuit Drawings.
(May 3, 1912)
(Supplemented by G.E.C. 322, 375, 403, 520, 672, 689, 766)

252 Substation Switching Keys.
(May 27, 1912)
(Supplemented by G.E.C. 281)

253 Loading of Telephone Circuits.
(June 11, 1912)
(Replacing in part G.E.C. 107)

254 Pole Relays, Code No. 191-A
(May 31, 1912)

255 Materials for Aerial Loading Coil Construction.
(June 10, 1912)

256 Memorandum on the Installation and Maintenance of Joint Telephone and Telegraph Offices, Classes 10-A and 11-A.

257 Subscriber's Station Installation—Line and Ground Wire Holes.
(June 18, 1912)

258 Maintenance of Transmitter Batteries at Isolated Telephone Stations.
(June 28, 1912)

259 Jack for Portable Telephones.
(June 29, 1912)

260 Number Plates for Stile Casings—Nos. 107-B and 23-C.
(July 12, 1912)
(Supplemented by G.E.C. 502)

261 Specifications for Underground Construction.
(Replacing G.E.C. 16, 33, 34, 55 and 64)
(Replaced by G.E.C. 386)

262 Annual Depreciation Rates.
(Supplemented by G.E.C. 330)

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263 Rural Lines—Central Office Equipment and Method of Operating.
(July 17, 1912)
(Replacing G.E.C. 23)
(Supplemented by G.E.C. 855)

264 "A" and "B" Supervisors' Equipment.
(July 29, 1912)
(Replacing T.C. 1 and 17 and G.E.C. 72)
(Supplemented by G.E.C. 548)

265 Standardization of 2-1/2 foot length for Receiver Cords Used with Desk Stands.
(July 16, 1912)

266 Standard Floor Plans for Telephone Central Offices.
(Preliminary)
(Replacing in part G.C. 48)
(Supplemented by G.E.C. 478 and 516)

267 Standardization of Central Office Equipment—Main Distributing Frames.
(Preliminary)
(Replaced by G.E.C. 358)

268 Specifications for Crossarm Braces.
(August 2, 1912)

269 Specifications No. 3505—Racks for Composite Sets and Composite Ringer Sets.
(August 2, 1912)

270 Relay Switchboard No. 10—Provision of Extra Panel of Multiple at the End of the Board.

271 Method of Increasing "B" Operating Efficiency During Hours of Light Traffic.
(August 15, 1912)
(Replaced in part by G.E.C. 765)
(Supplemented by G.E.C. 797)

272 Appraisal of Replacement Cost of Physical Plant.
(Supplemented by G.E.C. 287)

273 Redesigned No. 7 Coin Collector.
(August 24, 1912)

274 Material Used in Exchange Aerial Construction.

275 Improved Tinsel Switchboard Cords.
(August 30, 1912)
(Replacing C 17 and G.E.C. 67, 77, 83, 87 and 98)
(Supplemented by G.E.C. 376)

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276 Changes in Specifications for Pole Line Hardware.
(September 19, 1912)

277 Installation of Loading Coils T-300, T-680 and T-685 on Open Wire Lines—Specifications No. 3525.
(September 23, 1912)
(Supplementing G.E.C. 255)

278 Prevention of Electrolytic Corrosion in Prepayment No. 7 Coin Collector Coils.
(September 27, 1912)

279 Hub Guards.
(October 14, 1912)

280 Discontinuing the Manufacture of No. 11 Repeating Coils.

(Supplementing G.E.C. 154)

281 Substation Switching Keys.
(October 10, 1912)
(Supplementing G.E.C. 252)

282 Testing Cabinet for Magneto and Small Common Battery Offices.
(October 9, 1912)

283 Appraisal of Physical Plant—
(a) Typical Unit Costs.
(b) Suggestions as to Summary Forms.
(Supplemented by G.E.C. 361)

284 Specifications for Creosoted Yellow Pine Crossarms.
(Supplementing Specifications 3231 and G.E.C. 227 and 775)

285 Specifications for No. 17 Copper-Steel Wire.
(Replacing G.E.C. 93, 139 and 169)
(Replaced by G.E.C. 616)

286 Rubber Faced Answering Jack Number Plates.
(October 25, 1912)
(Supplementing G.E.C. 84)

287 Appraisal of Replacement Cost of Physical Plant.
(Supplementing G.E.C. 272)

288 Wiring of Large Buildings for Telephone Service.
(November 4, 1912)
(Replacing Bulletin 15 and G.C. 42)
(Supplemented by G.E.C. 768)

289 Standardization of Central Office Equipment Intermediate Distributing Frames.
(Preliminary)
(Replaced by G.E.C. 395)

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290 Improvement in No. 85 Type Substation Relay.

291 Folding Door Booth.
(November 25, 1912)
(Supplementing G.E.C. 248)
(Supplemented by G.E.C. 407)

292 Circuit for Grouping "A" and "B" Positions.
(November 27, 1912)
(Supplemented by G.E.C. 314, 447 and 589)

293 Rules for Resuscitation from Electric Shock.
(Supplemented by G.E.C. 532)

294 Standard Traffic Engineering Practices for Local and Toll Central Office Equipments.
(Supplemented by G.E.C. 540, 589 and 647)
(Replaced in part by G.E.C. 447, 548, 589 and 647)
(Replaced by G.E.C. 644)

295 No. 128 Receivers with and without Head Bands.
(December 5, 1912)

296 Standard Specifications for Repaired Material.
(December 9, 1912)
(Supplemented by G.E.C. 554)

297 Method of Making Fundamental Plans.
(December 27, 1912)
(Replacing G.E.C. 4 and 57)

298 Transmitting Specifications No. 3522—Replacement and Reinforcement Inspection of Pole Lines.
(December 12, 1912)
(Replacing G.C. 78)
(Supplemented by G.E.C. 685)

299 Modified Nos. 38, 39 and 40 Terminal Strips.
(January 6, 1913)
(Supplementing G.E.C. 214)

300 Metal Battery Box for Subscribers' Stations.
(January 10, 1913)

301 Method of Wiring Condensers in Toll Cord Circuits.
(January 2, 1913)

302 Cost of Private Branch Exchange Equipment for Receiving and Delivering Telegrams.
(January 13, 1913)
(Supplementing G.E.C. 228)

303 New Type Transmitter Arms.
(December 31, 1912)
(Replacing S.C. 24)

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304 Local and Toll Service Observing Equipment.
(Replaced by G.E.C. 534)

305 Improvement in Blue Bell Dry Battery.
(January 9, 1913)

306 Changes in No. 317 Type Subscribers' Sets.
(January 14, 1913)

307 No. 4 Private Branch Exchange.
(December 31, 1912)
(Supplementing S.C. 11)
(Replacing G.E.C. 28 and 89)

308 Transmitters for Metal Subscribers' Sets.
(Supplementing G.E.C. 245)
(Supplemented by G.E.C. 389)

309 Changes in No. 17 Cable Terminals.
(Supplementing G.E.C. 142)

310 Specifications No. 3375—Master Specifications for Composite Cable (Non-duplexed).
(Replaced by G.E.C. 575)

311 Duplex Cable.
(Supplementing G.E.C. 107)
(Replaced by G.E.C. 473)

312 Specifications for Cement and for the Inspection of Cement.
(January 27, 1913)

313 Improved Cord Hole Eyelet for Desk Stand Bases.
(February 5, 1913)

314 Circuit for Grouping "A" and Toll Switching Positions.
(February 8, 1913)
(Supplementing G.E.C. 292)

315 Improved Terminal Rack for Desk Stands and Transmitter Arms.
(February 14, 1913)

316 Connecting Block with Soldering Lugs.
(February 3, 1913)
(Supplemented by G.E.C. 531)

317 Changes in Equipment and Arrangement of No. 1 Trunk Switchboard Keyshelves.
(February 18, 1913)
(Replacing T.C. 5)
(Replaced in part by G.E.C. 548)
(Supplemented by G.E.C. 1057)

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318 Changes in Nos. 5 and 23 Induction Coils.
(February 4, 1913)

319 Alarm Signal for the Main Discharge Fuse.
(Preliminary)
(Replaced by G.E.C. 457)

320 Equipment for Public News Telephone Service.
(February 7, 1913)
(Supplementing S.C. 30)

321 Revised Specifications for Composite Sets.
(March 4, 1913)

322 Standard Switchboard and Circuit Drawings.
(February 19, 1913)
(Supplementing G.E.C. 250)
(Supplemented by G.E.C. 375 and 403)

323 Improved Ringer for Common Battery Four-party Selective Ringing Service.
(February 21, 1913)

324 Phantoming of Rural Subscribers' Lines—No. 1 Retardation Coil Box.
(February 20, 1913)

325 Antimony Alloy Sheath for Aerial Cables.
(February 15, 1913)
(Supplementing G.E.C. 223)

326 New Design of the No. 65 Terminal Strip for Horizontal Side of Main Distributing Frames.
(March 3, 1913)

327 Standardization of Central Office Equipment—Relay Racks.
(Preliminary)
(Replaced by G.E.C. 398)

328 Method of Handling Toll Calls from New Type Prepayment Multi-Coin Boxes.
(March 6, 1913)
(Supplementing G.E.C. 108 and 217)
(Supplemented by G.E.C. 411)

329 Standard Switchboard and Circuit Drawings.
(Supplementing G.E.C. 250)
(Supplemented by G.E.C. 394)

330 Rates of Depreciation.
(Supplementing G.E.C. 262)

331 Use of Tungsten Lamps for Resistance in Coin Box Current Leads.
(April 3, 1913)
(Replaced in part by G.E.C. 426 and 710)

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332 Metal Block Protected Cable Terminal.

333 Standardization of Black Finish for Ringer Gongs and Clapper Guards.
(March 25, 1913)

334 Arrangement of Equipment on Subscribers' Operators' Keyshelves for No. 92 Jack, 8-Panel Sections—Keyshelf locks—Grounding of Keyshelves.
(Replaced by G.E.C. 447)

335 Simplex Sets—Revised Specifications.
(Replaced by G.E.C. 409)

336 List of Standard Specifications.
(Replacing G.E.C. 135)
(Replaced by G.E.C. 794)

337 Standardization of Central Office Equipment—Installation Practices.
(Supplemented by G.E.C. 422 and 447)
(Replaced by G.E.C. 505)

338 No. 157 Receiver—Distinguishing Mark.
(April 17, 1913)

339 Wiring of the Outgoing Trunk Multiple Directly to the Main Frame and Intermediate Type Terminal Strip for the Main Distributing Frame.
(April 24, 1913)

340 Markings upon Bar or Cake Solder.
(Supplemented by G.E.C. 568)

341 Standard Switchboard and Circuit Drawings.
(Supplementing G.E.C. 250)
(Supplemented by G.E.C. 394)

342 List of Circular Letters and Bulletins.
(Replaced by G.E.C. 810, issued June 28, 1918)

343 Peg Count Register Key.
(May 6, 1913)
(Supplementing T.C. 31)
(Replaced in part by G.E.C. 447, 548, 589, 647 and 808)

344 Specifications for Telephone Power Machines.
(Replaced by G.E.C. 745)

345 Catalogue Cards of the American Bell Telephone Company's Transmitters and Receivers.
(April 21, 1913)

346 Tree Trimming and the Care of Trees.

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347 (Never issued).

348 (Never issued).

349 New Substation Receiver.
(April 24, 1913)
(Supplemented by G.E.C. 389 and 529

350 Auxiliary Framing on Terminal Room Ceilings for the Support of Frames, Cable Racks, etc.
(May 14, 1913)

351 Ventilating System for Telephone Booths.
(May 21, 1913)

352 Connecting Blocks for Use at Substations.
(May 22, 1913)
(Supplemented by G.E.C. 676)

353 Insulated Transmitters—Manufacturer's Testing Clip.
(May 20, 1913)
(Supplemented by G.E.C. 389)

354 Reporting Defective Material.
(June 9, 1913)
(Supplemented by G.E.C. 690)

355 Bridging Connectors Nos. 1, 2 and 3.
(June 2, 1913)

356 Method of Tying Receiver Cords—Sheets for the Handbook of Telephone Substation Circuits.
(Supplementing G.E.C. 349)

357 Standardization of Central Office Equipment—Coil Rack and Fuse Boards.
(Replaced by G.E.C. 501)

358 Standard Main Distributing Frames.
(June 23, 1913)
(Replacing G.E.C. 267)
(Supplemented by G.E.C. 675 and 798)

359 Standardization of Central Office Equipment—No. 92—Jack 8-Panel Subscribers' Sections.
(Replaced by G.E.C. 447)

360 Requirements for 25-Foot Class "C" Cedar Poles.
(June 25, 1913)

361 Appraisal of Physical Plant—Checking Unit Costs.
(Supplementing G.E.C. 283)

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362 Errors in Assembly—No. 38-B Repeating Coils.

363 New Standard Central Office Message Register —Lockup Type.
(July 14, 1913)

364 Tools for Removing Worn No. 49 Jack Sleeves.
(July 7, 1913)

365 Brush Treatment for Poles.
(July 11, 1913)
(Supplemented by G.E.C. 400)

366 Information in Regard to New or Modified Apparatus—Issuing of Western Electric Company Catalogue Cards.
(July 15, 1913)

367 Direct Current Commutating Pole Motors for Charging Generators.
(July 16, 1913)

368 Transmitting Specifications No. 3292 for Beeswax Compound.
(July 21, 1913)
(Replacing G.E.C. 243 and Specifications 3242)

369 Substation Number and Instruction Plates.
(August 1, 1913)

370 Insulation of Metal Subscribers' Equipment from Metal Walls.
(August 19, 1913)

371 New Phantom Circuit Repeating Coil—Code No. 46-A. Discontinuance of Manufacture of Nos. 25-AA, 37-A, 37-B and 38-B Repeating Coils.
(September 2, 1913)
(Replacing G.C. 84)
(Replacing in part G.E.C. 192)

372 Rubber Covered Plug Shelves.
(July 18, 1913)

373 Abandonment of Compound Receiver No. 113.

374 Gauges for No. 92 Jack Sleeves.
(July 22, 1913)
(Supplementing G.E.C. 119)

375 Standard Switchboard and Circuit Drawings—Relay Switchboard No. 1.
(July 25, 1913)
(Supplementing G.E.C. 250 and 322)
(Supplemented by G.E.C. 403)

376 Improved Tinsel Switchboard Cord.
(July 29, 1913)
(Supplementing G.E.C. 275)
(Supplemented by G.E.C. 463 and 864)

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377 Standardization of Engraving for Call Circuit Key Buttons.
(August 6, 1913)

378 Transmitters for Use with No. 50 Coin Collectors.
(August 6, 1913)
(Supplemented by G.E.C. 389)

379 Improved Worsted Receiver Cords.
(August 6, 1913)

380 Machine Ringing—Premature Operation of Tripping Relays Due to Breakdown of Line Insulation.
(August 19, 1913)

381 No. 84-E Interrupter for Four-Party Selective Ringing.—No. 84-B Abandoned.
(August 15, 1913)
(Supplemented by G.E.C. 841)

382 Installation of Loading Coils No. 511 (T-680) and No. 512 (T-685) on Open Wire Lines: Spacing Coils and Grouping Coils on Poles at Loading Points.—Specifications No. 3620.
(August 26, 1913)

383 Standardization of Central Office Equipment—Specifications No. KS-2, "Switchboard Wiring and Mounting of Apparatus for Central Office Equipment".
(Replaced by G.E.C. 540)

384 Specifications for Message Register Generators—Increase in Voltage.
(Supplementing G.E.C. 363)
(Replaced by G.E.C. 745)

385 New Unit Type Protector Mounting for Main Distributing Frames.
(September 9, 1913)
(Replacing in part G.E.C. 186)

386 Transmitting Specifications No. 3613—Revised Specifications for Underground Conduit Construction.
(September 12, 1913)
(Replacing G.E.C. 261)
(Supplemented by G.E.C. 420, 793 and 874)

387 Battery Boxes for Dry Cells—Use of Dry Cells Morse Local Battery and Transmitter Local Battery.
(September 16, 1913)

388 Revised Specifications Nos. 3356 and 3357 for Nos. 22 and 19 Gauge Cable Respectively.
(Supplemented by G.E.C. 598)

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389 Insulated Substation Apparatus.
(October 11, 1913)
(Supplementing G.E.C. 349, 353 and 378)

390 Rope Containing Metallic Strands.
(September 26, 1913)

391 Inventory by Interstate Commerce Commission.

392 Tandem Trunking Method for Handling A-B Toll and Free Traffic.
(October 3, 1913)

393 Tool for Removing Lamp Caps Mounted on Close Centers.
(October 6, 1913)

394 Standard Switchboard and Circuit Drawings.
(Supplementing G.E.C. 250, 329 and 341)

395 Standard Intermediate Distributing Frames.
(October 9, 1913)
(Replacing G.E.C. 289)
(Supplemented by G.E.C. 654)

396 Cord for Suspended Type Transmitter.
(October 13, 1913)

397 Supplying Ringing Current over Cable Pairs to Private Branch Exchanges.
(October 14, 1913)

398 Standard Relay Racks.
(October 17, 1913)
(Replacing G.E.C. 327)
(Supplemented by G.E.C. 475)

399 Switchboard Platforms and Operators' Chairs.
(Supplementing G.E.C. 189)
(Supplemented by G.E.C. 628)

400 Specifications for Brush Treatment of Poles.
(October 18, 1913)
(Supplementing G.E.C. 365)

401 Transmitting Specifications for Crossings of Telephone Lines over Steam Railroads.
(October 20, 1913)
(Supplemented by G.E.C. 530)

402 One Point Transposition Brackets and Steel Pins for Transposition Brackets.
(October 23, 1913)
(Replacing G.E.C. 224)

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403 Standard Switchboard and Circuit Drawings.
(October 31, 1913)
(Supplementing G.E.C. 250, 322 and 375)

404 No. 12 Type Fuse—Improved Design.

405 Standard Drop Light Handle and Guard for Use in Operating and Terminal Rooms.
(November 10, 1913)

406 Letter Code for Indicating Variations in Dimensions on Drawings.
(November 21, 1913)

407 Folding Door Booth.
(November 26, 1913)
(Supplementing G.E.C. 248 and 291)
(Supplemented by G.E.C. 533)

408 Installation of Loading Coils on Open Wire Lines—Specifications for Loading Pole-Pair Circuits—Specifications No. 3617.
(December 29, 1913)

409 Simplex Set—Transmitting Specifications No. 3623.
(December 15, 1913)
(Replacing G.E.C. 335)

410 Standard Switchboard and Circuit Drawings.
(Supplementing G.E.C. 250)

411 No. 50 Type Prepayment Multi-Coin Collector.
(December 20, 1913)
(Supplementing G.E.C. 108, 217 and 328)

412 Standard Switchboard and Circuit Drawings.
(Supplementing G.E.C. 250)

413 Guy Anchors—Special Types.
(Supplemented by G.E.C. 697 and 796)

414 Improved Operator's Telephone Set Cord.
(January 9, 1914)

415 Cable Terminal for Use in Buildings—Standardization of No. 22 Cable Terminal and Nos. 1, 2 and 3 Fanning Strips.
(January 19, 1914)
(Supplemented by G.E.C. 768)

416 No. 1 Type Ground Strip for Nos. 17 and 80 Type Protectors.
(January 12, 1914)

417 Switchboard Clocks for Use at "A" Positions.
(January 31, 1914)
(Supplemented by G.E.C. 471 and 600)

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418 Supplement No. 1 to Bulletin on Transmission Equivalents.
February 6, 1914)
(Supplementing and replacing in part G.E.C. 247)
(Supplemented by G.E.C. 419 and 484)

419 Transmission Data.
(February 6, 1914)
(Supplementing G.E.C. 247 and 418)

420 Underground Conduit Material Specifications.
(February 16, 1914)
(Supplementing G.E.C. 386)
(Supplemented by G.E.C. 679 and 873)

421 Standardization of Central Office Equipment—Miscellaneous Equipment Practices.
(Replaced by G.E.C. 521)

422 Standardization of Central Office Equipment—Installation Practices.
(Supplementing G.E.C. 337)
(Replaced by G.E.C. 505)

423 Power Plant Wiring—Omission of Individual Cell Voltmeter Leads to Storage Batteries.
(February 21, 1914)

424 Standardization of Central Office Equipment—Proposed Standard Message Register Racks.
(Replaced by G.E.C. 537)

425 Emergency Plugging-Up Cords—Relay Switchboard No. 1
(February 27, 1914)
(Supplemented by G.E.C. 689 and 766)

426 Use of Tungsten Lamps for Resistances in Coin Box Current Leads.
(February 17, 1914)
(Replacing in part G.E.C. 331)

427 Pick-up Alarm Circuit—Machine Ringing.
(February 28, 1914)

428 Improved Types "A" and "B" Composite Ringers.
(April 8, 1914)

429 Repair of Tinsel Switchboard Cords.
(February 26, 1914)
(Supplemented by G.E.C. 848)

430 High Impedance Relay for Use in New Toll Cord Circuits.
(March 3, 1914)
(Supplementing G.E.C. 146)

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431 Transmitting Specifications No. 3639—Transposing Single and Phantom Circuits and Dead-ending Wires at Test and Terminal Poles, Each Wire Attached to a Separate Insulator.
(February 27, 1914)
(Supplemented by G. E. C. 444 and 618)

432 Testing Circuit for Use in Connection with New Toll Cord Circuits.
(March 4, 1914)

433 Standardization of Central Office Equipment—No. 92 Jack 7-Panel Trunk Sections.
(Replaced by G. E. C. 548)

434 Residence System No. 1.
(March 26, 1914)
(Supplemented by G. E. C. 591)

435 Transmitting Specifications No. 3629—Installation of Loading Coils on Open Wire Lines, "H" Fixture Construction Along the Line.
(April 27, 1914)

436 Folding Handle for Emergency Hand Generators.
(March 25, 1914)

437 All Metal Telephone Booths.
(March 16, 1914)
(Supplemented by G. E. C. 533)

438 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

439 Polar Duplex Telegraph System—Specifications No. 3558.
(Replacing G. E. C. 220)

440 New Type Line and Cut-off Relay.
(March 31, 1914)
(Supplemented by G. E. C. 475)

441 Separation of Aerial Cable Strand Ground and Protector Ground at Underground Cable Terminals.
(Supplementing Specifications 3235)
(Supplemented by G. E. C. 641)

442 Plan for Giving Independent Companies Service over Bell Toll Lines.
(April 10, 1914)
(Supplemented by G. E. C. 486)

443 Transmitters and Receivers Removed from Subscribers' Stations.
(April 18, 1914)

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444 Transmitting Specifications No. 3664—"Transposing Phantom Circuits Made Up of Pole Circuits on Adjacent Arms, Terminating Wires at Test Poles and Terminal Poles, Each Wire Attached to a Separate Insulator."
(April 10, 1914)
(Supplementing G. E. C. 431)

445 Street Railway Telephone Set No. 278.
(Supplementing G. E. C. 235)

446 Photographs of Construction Work.

447 Standard No. 92 Jack 8-Panel Subscribers' Section.
(May 26, 1914)
(Supplementing G. E. C. 189 and 292)
(Replacing in part G. E. C. 294 and 343)
(Supplemented by G. E. C. 589)
(Replaced in part by G. E. C. 773)

448 Omission of Subscribers' Multiple from "A" Switchboards—Multiple Answering Jacks and Lamps.
(May 25, 1914)

449 Machine for Cleaning Switchboard Plugs.
(April 29, 1914)

450 Maximum Cable Lengths.

451 Concrete Steel Reinforcement for Poles.
(May 12, 1914)
(Replacing G. E. C. 128)

452 Modification of No. 61 Protector Mounting.
(May 11, 1914)

453 Marking of Defective Pairs in Lead Covered Cable.
(May 13, 1914)
(Supplemented by G. E. C. 604)

454 Galvanizing No. 14 Cable Terminals.
(Supplementing G. E. C. 204)
(Replaced by G. E. C. 536)

455 New Local Test Desk for No. 1 Relay Switchboard Equipments.
(May 18, 1914)
(Supplemented by G. E. C. 560)

456 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

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457 Alarm Signal for Main Discharge Fuse.
(May 14, 1914)
(Replacing G. E. C. 319)
(Supplemented by G. E. C. 817)

458 Plugging Up Lines in Trouble.
(May 14, 1914)

459 Automatic Keyshelf Brace.
(May 15, 1914)

460 Specifications for Silk and Cotton Insulated Cable. Specifications Nos. 3650, 3651 and 3652.
(May 22, 1914)

461 Moisture-proof Switchboard Cable.
(May 19, 1914)
(Supplemented by G. E. C. 762)

462 Connection of Private Signaling Circuits to the Telephone Plant.
(June 1, 1914)
(Replacing in part G. E. C. 54)
(Supplemented by G. E. C. 523)

463 Improved Two-Conductor Tinsel Switchboard Cord, Improved Test and Morse Board Cords and Service Observing Cords.
(May 27, 1914)
(Replacing in part G. E. C. 157 and 207)
(Supplementing G. E. C. 376)

465 New Type Buzzer for Private Branch Exchanges.
(June 15, 1914)
(Supplemented by G. E. C. 972)

466 Specifications for Manila Rope.
(June 17, 1914)

467 Clearance of Telephone Wires, Cables and Guys at Highway Crossings.
(June 19, 1914)

468 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

469 (a) Joint Use of Poles.
(b) High Tension Crossings.
(July 13, 1914)

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470 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

471 Switchboard Clocks for Use at "A" Positions.
(July 23, 1914)
(Supplementing G. E. C. 417)

472 Specifications No. 3630—Preliminary Specifications for No. 22 Gauge Cable (Small Diameter Type).
(Replaced by G. E. C. 494)

473 Duplex Cable.
(July 28, 1914)
(Replacing G. E. C. 311)
(Supplemented by G. E. C. 597, 598 and 657)

474 No. 50-A Coin Collector.
(July 29, 1914)

475 Standard Relay Rack.
(August 11, 1914)
(Supplementing G. E. C. 398 and 440)

476 Arrangement of Keyboard Lamp Caps and Guards, and Pilot Lamp Caps and Guards.
(August 5, 1914)
(Replacing in part G. E. C. 79)

477 Splicing Cable—Use of Cotton Sleeving.
(Supplemented by G. E. C. 538)

478 Standard Floor Plan Arrangements for Telephone Buildings, in Single-Office Districts.
(August 25, 1914)
(Supplemented by G. E. C. 516)

479 Enameled Distributing Frame Wire.
(August 28, 1914)
(Supplemented by G. E. C. 761)

480 Copper Block Cut-out for No. 8 Type Protector.
(August 31, 1914)

481 Transmitting Preliminary Draft—Handbook of Substation Practice.
(Supplemented by G. E. C. 596, 622, 642 and 712)

482 Switchboard Lighting.
(September 14, 1914)
(Supplementing G. E. C. 124 and 166)
(Supplemented by G. E. C. 726)

483 Linemen's Test Set—No. 17 Type.
(September 15, 1914)

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484 Transmittal of "Examples Illustrating the Use of the Bulletin on Transmission Equivalents" and Printed Copy of "Supplement No. 1 to Bulletin on Transmission Equivalents."
(September 24, 1914)
(Supplementing G. E. C. 247 and 418)

485 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

486 Plan for Giving Independent Companies Service Over Bell Toll Lines.
(October 13, 1914)
(Supplementing G. E. C. 442)
(Supplemented by T. C. 123)

487 Railroad Private Branch Exchange Equipment.
(November 27, 1914)

488 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

489 Instructions Governing the Use of Dynamite.
(Supplementing Specifications 2079)
(Supplemented by G. E. C. 776 and 799)

490 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

491 Standardization of Central Office Equipment—Location of Rolling Ladders Relative to Frames and Racks.
(November 11, 1914)

492 Collection of Federal Tax on Telephone Messages.
(Supplemented by G. E. C. 495, 499, 504 and 518)
(Replaced by G. E. C. 669)

493 Ticket Pad Holder and Ticket Receptacle.
(November 30, 1914)

494 Small Diameter Type Cable—Specifications No. 3729.
(December 1, 1914)
(Replacing G. E. C. 472)
(Supplemented by G. E. C. 598)

495 Collection of Federal Tax on Telephone Messages.
(Supplementing G. E. C. 492)
(Supplemented by G. E. C. 499, 504 and 518)
(Replaced by G. E. C. 669)

496 New Type Supervisory Relay.
(November 27, 1914)

497 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

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498 Grounding Cables at Office Manholes.
(Replacing C. 21)

499 Collection of Federal Tax on Telephone Messages.
(Supplementing G. E. C. 492 and 495)
(Supplemented by G. E. C. 504 and 518)
(Replaced by G. E. C. 669)

500 Oil Insulators and Pedestal Supports for Mounting Storage Batteries.
(December 8, 1914)

501 Standard Fuse Boards and Subscribers' and Trunk Coil Racks.
(December 15, 1914)
(Replacing G. E. C. 357)
(Supplemented by G. E. C. 854)

502 Number Plates Nos. 1-B, 2-B, 12-B and 113-B.
(December 16, 1914)
(Supplementing G. E. C. 260)

503 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

504 Collection of Federal Tax on Telephone Messages.
(Supplementing G. E. C. 492, 495 and 499)
(Supplemented by G. E. C. 518)
(Replaced by G. E. C. 669)

505 Standardization of Central Office Equipment—Standard Installation Practices.
(December 22, 1914)
(Replacing G. E. C. 337 and 422)
(Supplemented by G. E. C. 540)

506 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

507 Cross-connecting Wire for Duplex Cable.
(Supplementing G. E. C. 473)
(Replaced by G. E. C. 615)

508 Dead Oil of Coal Tar for Brush Treatments.
(Supplementing G. E. C. 213 and Specifications 3430)
(Replaced by G. E. C. 581)

509 Modification of Operators' Telephone Sets.
(Replaced by G. E. C. 661)

510 Guy Hooks.
(February 15, 1915)
(Supplementing G. E. C. 276)

511 Starters for Alternating Current Motors.
(February 10, 1915)
(Replacing in part G. E. C. 125)

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512 Substitute for Carbolineum.
(Supplementing G. E. C. 213 and Specifications 3431)
(Replaced by G. E. C. 581)

513 Composite Cable (Non-Duplex) Combinations.
(February 17, 1915)
(Supplemented by G. E. C. 544)

514 No. 9 Switchboard Equipment—Information in Regard to Stock Equipment and Time Required to Make Deliveries.
(February 18, 1915)

515 No. 5-L Type Message Register.
(February 24, 1915)

516 Standard Floor Plan Arrangements for One-unit Telephone Buildings in Multi-office Districts.
(March 4, 1915)
(Supplementing G. E. C. 478)

517 Specifications for Dead Oil of Coal Tar.
(March 11, 1915)
(Replacing G. E. C. 159)

518 Collection of Federal Tax on Telephone Messages.
(Supplementing G. E. C. 492, 495, 499 and 504)
(Replaced by G. E. C. 669)

519 Telegraph Key No. 1-A.
(March 12, 1915)

520 Standard Switchboard and Circuit Drawings.
(March 17, 1915)
(Supplementing G. E. C. 250)

521 Standardization of Central Office Equipment—Miscellaneous Standard Equipment Practices.
(March 19, 1915)
(Replacing G. E. C. 421)
(Supplemented by G. E. C. 615)

522 Glass Sand Trays and Glass Covers for Storage Batteries.
(March 24, 1915)

523 Line Fuse for No. 74 Type Protector.
(April 1, 1915)
(Supplementing G. E. C. 462)

524 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

525 Standard Armature Air Gaps for Substation Ringers.
(April 3, 1915)

526 Redesigned No. 44 Type Fuse.
(April 5, 1915)
(Supplemented by G. E. C. 1069)

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527 Notes on Toll Fundamental Plans.
(July 1, 1915)

528 High Tension Crossings.
(April 28, 1915)
(Supplemented by G. E. C. 784 and 785)

529 No. 144 Receiver—Code Number in Ear Cap.
(April 20, 1915)
(Supplementing G. E. C. 349)

530 Specifications for Crossings of Telephone Lines over Steam Railroads.
(April 23, 1915)
(Supplementing G. E. C. 401)

531 Standardization of No. 10 Type Connecting Block.
(April 28, 1915)
(Supplementing G. E. C. 316)

532 Rules for Resuscitation of Persons Overcome by Gas.
(Supplementing G. E. C. 293)

533 Folding Door Booth.
(April 30, 1915)
(Supplementing G. E. C. 407 and 437)

534 Local and Toll Service Observing Equipments.
(June 9, 1915)
(Replacing G. E. C. 304)

535 Burnisher No. 1-A.
(May 14, 1915)

536 Galvanizing No. 14 Cable Terminals.
(May 18, 1915)
(Replacing G. E. C. 204 and 454)

537 Standard Message Register Racks and Casings.
(May 24, 1915)
(Replacing G. E. C. 424)
(Supplemented by G. E. C. 777)

538 Splicing Cable—Use of Cotton Sleeve.
(Supplementing G. E. C. 477)
(Replaced by G. E. C. 604)

539 Specifications No. 3750—"The Care and Operation of Storage Batteries".
(June 10, 1915)
(Replacing Bulletin 17 and G. E. C. 153)

540 Specifications No. KS-2-Switchboard Wiring and Mounting of Apparatus for Central Office and Private Branch Exchange Equipments.
(May 21, 1915)
(Replacing in part G. E. C. 79)
(Replacing G. E. C. 383)
(Supplementing G. E. C. 79, 215, and 505)
(Supplemented by G. E. C. 637 and 806)
(Replaced in part by G. E. C. 806)

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541 Cincinnati Clips.
(May 26, 1915)

542 Mercury Arc Rectifiers for Charging Storage Batteries.
(July 23, 1915)
(Replacing G. E. C. 85)
(Supplemented and replaced in part by G. E. C. 754)

543 Specifications for Lead Sleeving.
(June 11, 1915)
(Replacing G. E. C. 94)

544 Composite Cable (Non-Duplex) Combinations.
(June 29, 1915)
(Supplementing G. E. C. 513)
(Supplemented by G. E. C. 657)

545 Abandonment of High Resistance Heat Coils.
(July 7, 1915)

546 Standardization of Spring Terminals and No. 540 Cord for Connection of Blue Bell Dry Batteries.
(July 9, 1915)
(Supplemented by G. E. C. 856)

547 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

548 Standard No. 92-Jack, 7-Panel Trunk Section.
(August 5, 1915)
(Replacing G. E. C. 102 and 433)
(Replacing in part G. E. C. 144, 294, 317 and 343)
(Supplementing G. E. C. 189 and 264)
(Replaced in part by G. E. C. 763 and 773)

549 Improved Loud Ringing Extension Bell Sets.
(July 30, 1915)

550 Receiver Cords—Covering for Tips.
(August 3, 1915)

551 No. 29—A Binding Post—Auxiliary Binding Post for Nos. 14 and 8 Cable Terminals.
(August 4, 1915)

552 Routine and Equipment for Handling Trouble Reports and Certain Associated Work.
(August 9, 1915)
(Replaced in part by G. E. C. 893)

553 Copyrighting Publications.
(August 6, 1915)

554 Recovery of Substation Equipment
(August 6, 1915)
(Supplementing G. E. C. 296)

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555 Effect of Metal Prices on Cable Changes.
(August 10, 1915)

556 Desk Stand Cords with Improved Tinsel.
(August 11, 1915)

557 Waterproof Desk Stand Cords.
(August 12, 1915)

558 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

559 Primary Battery for Current Supply for Magneto Switchboards.
(August 17, 1915)
(Supplemented by G. E. C. 625 and 802)

560 Local Test Desk No. 12.
(September 15, 1915)
(Supplementing G. E. C. 455)
(Supplemented by G. E. C. 666 and 672)

561 Nut Fit for Bolts Having a Short Length of Thread.
(August 25, 1915)
(Supplementing G. E. C. 276, and Specifications 3069, 3124, 3326, 3382 and 3550)

562 Specifications for Storage Batteries—Chloride Accumulator Type.

563 Specifications No. 3736—"Specifications for Locating Transpositions—Standard System."
(October 15, 1915)
(Replacing G. E. C. 240)
(Replacing in part Specifications 2851, 2277, 2942, 3120, 3146 and Preliminary Draft of 3269)
(Supplemented and replaced in part by (G. E. C. 738)

564 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

565 Magneto Switchboards No. 105-A and No. 105-B.
(October 5, 1915)
(Supplemented by G. E. C. 747)
(Supplementing G. E. C. 174)

566 Reels of Copper-steel Outside Distributing Wire.
(Supplementing Specifications 3534)
(Replaced by G. E. C. 616)

567 Distinguishing Colors for Distributing Frame Wire.
(Replaced by G. E. C. 587)

568 Markings upon Bar and Cake Solder.
(October 25, 1915)
(Supplementing Specifications 3438, 3439 and 3440)

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569 Handling Carbon Protector Blocks and Micas.
(October 26, 1915)

570 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

571 Telephone Connections for Trains at Stations.
(November 29, 1915)

572 Standard Lengths for Receiver and Desk Stand Cords.
(December 1, 1915)

573 Specifications for Submarine Cable—Specifications 3542, 3543, 3544 and 3545.
(December 17, 1915)
(Replacing G. E. C. 164)

574 Sleet Storm Data.
(December 27, 1915)
(Supplemented by G. E. C. 617 and 713)

575 Master Specifications for Composite Cable (Non-duplex).
(January 3, 1916)
(Replacing G. E. C. 310)
(Supplemented by G. E. C. 598)

576 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

577 Redesigned 3 by 7 Cordless Private Branch Exchange.
(January 20, 1916)
(Supplementing G. E. C. 195)
(Replacing G. E. C. 198 and 242)

578 Improvements in Design of Central Office Heat Coil.
(March 2, 1916)
(Replacing G. E. C. 106)

579 Sleet Storm Data for U. S. Bureau of Standards.
(January 25, 1916)
(Supplemented by G. E. C. 617)

580 Maintenance of Main Frame Heat Coils and Protector Springs.
(January 28, 1916)

581 Specifications for Dead Oil or Coal Tar for Brush Treatments, etc.
(February 4, 1916)
(Replacing G. E. C. 213, 508 and 512)

582 Private Branch Exchange Switchboard No. 550-A.
(February 3, 1916)
(Replacing G. E. C. 232)
(Replaced in part by G. E. C. 665)

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583 Specifications for Creosoted Yellow Pine and Douglas Fir Crossarms.
(February 7, 1916)
(Supplementing G. E. C. 227)
(Replaced in part by G. E. C. 708)
(Supplemented by G. E. C. 775)

584 Improved Calculagraph.
(February 8, 1916)

585 Sleeve Joints in Copper Line Wire.

586 Protection of Telephone Conductors Leased for the Operation of Signaling Systems other than Telephone.
(February 15, 1916)
(Supplemented by G. E. C. 821 and 1077)

587 Distinguishing Colors for Distributing Frame Wire.
(Replacing G. E. C. 567)
(Replaced by G. E. C. 615)

588 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)
(Referring to G. E. C. 565)

589 Standard No. 49 Jack 7-Panel Subscribers' Sections.
(March 10, 1916)
(Replacing in part G. E. C. 294 and 343)
(Supplementing G. E. C. 189, 292 and 447)
(Replaced in part by G. E. C. 736)

590 Lubrication of No. 1-A Electric Clocks.
(March 1, 1916)

591 No. 1 Residence system.
(March 8, 1916)
(Supplementing G. E. C. 434)

592 Data for Determining the Proper Size of Central Office Storage Batteries.
(March 9, 1916)

593 New Type Metal Subscribers' Set.
(March 6, 1916)
(Supplemented by G. E. C. 1016)

594 Mechanically and Electrically Operated Peg Count Apparatus.
(March 14, 1916)
(Replacing in part T. C. 31)
(Replacing T. C. 32)

595 Guy Shield Plugs.
(March 13, 1916)

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596 Box for Mounting Protectors Outside of Buildings—No. 82-A Protector Mounting.
(March 15, 1916)

597 Duplex Cable.
(March 10, 1916)
(Supplementing G. E. C. 473)

598 Capacity of Paper Insulated Cable—Proposed Change in Method of Measuring.
(March 17, 1916)
(Supplementing G. E. C. 473, 494 and 575)

599 Toll Test Board No. 4.
(March 15, 1916)

600 Switchboard Clocks for Use at "A" Positions.
(March 21, 1916)
(Supplementing G. E. C. 417)

601 Pole and Crossarm Data.
(March 16, 1916)

602 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)
(Referring to G. E. C. 534)

603 Tinned Steel Sleeves.
(Supplementing G. E. C. 96)

604 Standardization of Outside Plant Practices—Placing Underground Cable and Splicing Lead Covered Paper Insulated Cables.
(April 3, 1916)
(Supplementing G. E. C. 453)
(Replacing G. E. C. 538)
(Supplemented by G. E. C. 702, 778 and 938)

605 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

606 Change in Manganese Used for Dry Cell Manufacture.
(April 26, 1916)

607 Telegraph Relay No. 25-A.
(April 25, 1916)

608 Cable Fault Locating Set—Exploring Coil Type.
(April 26, 1916)
(Supplemented by G. E. C. 1071)

609 Method of Placing Aerial Cable Rings.

610 Telegraph Relays Nos. 21-A, 22-A, 23-A and 24-A.
(May 2, 1916)

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611 Cable Paper.
(May 1, 1916)

612 Use of Superimposed Current for Operation of Selective Four-Party Bells.
(May 12, 1916)
(Supplemented by G. E. C. 744)

613 Specifications for Insulator Pins.
(May 5, 1916)
(Replacing G. E. C. 11, 82 and 110)
(Supplemented by G. E. C. 809)

614 Change in Distinguishing Colors on Individual Conductors of Switchboard Cords.
(May 8, 1916)

615 Change in Color Code for Distributing Frame Wire.
(May 11, 1916)
(Supplementing G. E. C. 521)
(Replacing G. E. C. 507 and 587)

616 Specifications for Outside Distributing Wires.
(May 18, 1916)
(Replacing G. E. C. 194, 197, 285 and 566)

617 Wind and Sleet Data for U. S. Weather Bureau.
(May 17, 1916)
(Supplementing G. E. C. 574 and 579)
(Supplemented by G. E. C. 713)

618 Specifications for Break Irons and 5/8" Steel Insulator Pins.
(May 29, 1916)
(Supplementing G. E. C. 431)
(Supplemented by G. E. C. 619)

619 Specifications for the Installation of New Type Break Irons and Old Type Break Irons Equipped with 5/8-Inch Steel Pins.
(May 29, 1916)
(Supplementing G. E. C. 618)

620 Clamps for Small Cables and Ground Wires.

621 Specifications for Inside Wire.
(May 31, 1916)
(Replacing G. C. 75 and 86)

622 Specifications for No. 14 Ground Wire.
(May 31, 1916)
(Supplemented by G. E. C. 875)

623 Redesigned No. 85 Plug.
(May 22, 1916)

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624 Testing Circuit for Toll Line Busy Signals.
(May 23, 1916)

625 Fusing No. 502 Battery Leads.
(May 26, 1916)
(Supplementing G. E. C. 559)

626 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

627 Relay Switchboard No. 1-C—Machine Ringing and Automatic Listening "A" Cord Circuits.
(June 6, 1916)
(Referred to in T. C. 95)

628 Operators' Chairs.
(Supplementing G. E. C. 189 and 399)
(Supplemented by G. E. C. 752)

629 New Method of Connecting Four-Party Selective Extension Bells.
(June 7, 1916)

630 Exposed Cables Entering Central Office and Subscribers' Buildings.
(June 14, 1916)
(Replacing G. E. C. 47)

631 Duplex Rheostat No. 5-A—(Old Number 101, 414).
(June 13, 1916)
(Supplementing Specification 3558)

632 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

633 No. 6-A Rheostat.
(June 19, 1916)
(Supplementing Specification 3558)

634 Transmission Measuring Set.
(June 28, 1916)
(Supplemented by G. E. C. 1034)

635 New Aerial Type 22 Gauge Cable.
(June 14, 1916)
(Supplemented by G. E. C. 852)

636 Resurfacing and Reengraving Call Circuit Key Buttons.
(June 22, 1916)

637 Color Scheme and Arrangement of Cords, Signals and Number Plates for No. 9-C Switchboards.
(June 27, 1916)
(Supplementing G. E. *D.* 540)
(Replaced in Part and Supplemented by G. E. C. 806)

[fol. 15367] 638 Designation Strips.
(June 26, 1916)

639 Large Gauge Cable.
(June 23, 1916)

640 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

641 Discontinuance of Practiee of Grounding Aerial Cable Sheaths.
June 30, 1916)

642 Type "C" Porcelain Knob.
(July 6, 1916)
(Supplemented by G. E. C. 1020)

643 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

644 Standard Traffic Engineering Practices for Local and Toll Central Office Equipment.
(November 13, 1916)
(Supplementing G. E. C. 177)
(Replacing G. E. C. 294)
(Supplemented by G. E. C. 886)
(Replaced in part by T. C. 143)

645 Switches for Duplex Sets.
(July 13, 1916)
(Supplementing Specifications 3558)

646 Automatic Water-Fillers for Storage Batteries.
(July 18, 1916)
(Replacing in part Specifications 3697)

647 Standard Equipment for Trunk Operators' Positions at No. 49 and No. 92 Jack Subscribers' Sections.
(July 26, 1916)
(Replacing in part G. E. C. 144, 294 and 343)
(Replaced in part by G. E. C. 763)
(Supplemented by G. E. C. 884)

648 Tool for Operating "A" Type Cut-off Relays Previous to Cut-Over
(July 27, 1916)

649 Aerial Cable Rings.
(July 29, 1916)
(Supplementing Specifications 3297)

650 Specifications for Ground Rods.
(August 7, 1916)
(Supplemented by G. E. C. 1000)

[fol. 15368]

651 Requirements for 25-foot, Class "C" Cedar Poles.
(August 1, 1916)

652 Inductive Interference from Power Circuits.
(August 10, 1916)
(Supplemented by G. E. C. 738, 821, 900, 901, 904 and 915)
(Replaced in part by G. E. C. 825)

653 No. 14 Type Cable Terminals Equipped with Special Wooden Face Panels.
(August 4, 1916)

654 Standard Intermediate Distributing Frames.
(August 18, 1916)
(Supplementing G. E. C. 395)

655 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

656 Change in Condensers Used in Subscribers' Sets.
(August 21, 1916)
(Supplemented by G. E. C. 740 and 857)

657 Composite Cable.
(August 24, 1916)
(Supplementing G. E. C. 473 and 544)

658 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

659 Discontinuing No. 311 Transmitters.
(August 29, 1916)
(Supplemented by G. E. C. 692)

660 New Breast Plate for Operator's Transmitter No. 234.
(August 30, 1916)

661 Monitoring Circuits.
(September 7, 1916)
(Replacing G. E. C. 509.)

662 New Winding for Nos. 6-A, 7-A and 8-A Ringers.
(September 5, 1916)

663 Tool for Adjusting Middle Spring of No. 125 Type Relays.
(September 11, 1916)

664 Cooperation between Electric Light and Power Industry and Telephone Industry to Reduce Interference.
(September 27, 1916)

665 Private Branch Exchange Switchboard—No. 550-B.
(September 18, 1916)
(Replacing Bulletin 1)
(Replacing in part G. E. C. 582)

[fol. 15369]

666 Improved Tinsel Cords for Use in Testing Circuits.
(September 19, 1916)
(Supplementing G. E. C. 560)

667 Shellac for Dressing Cable Forms.
(September 20, 1916)

668 Central Information Desk No. 1.
(September 29, 1916)
(Supplementing T. C. 63)
(Referring to T. C. 73)

669 Discontinuance of Federal Tax on Telephone Messages.
(September 25, 1916)
(Replacing G. E. C. 492, 495, 499, 504 and 518)

670 Use of Frankel Test Clips.
(October 3, 1916)
(Supplemented by G. E. C. 749)

671 Plugs for Plugging Out Permanent Signals on Magneto Boards and on Common Battery Boards Employing Cut-off Jacks.
(October 4, 1916)

672 Standard Switchboard and Circuit Drawings.
(October 5, 1916)
(Supplementing G. E. C. 250 and 560)

673 Telegraph Repeater No. 3-A
(October 18, 1916)
(Replacing G. E. C. 132)

674 Standardization of Outside Plant Practices—Specifications for the Construction of Toll Pole Lines.
(October 19, 1916)
(Replacing G. E. C. 40, 58 and 115)
(Supplemented by G. E. C. 1010)

675 Standard Main Distributing Frames.
(October 26, 1916)
(Supplementing G. E. C. 358)

676 Connecting Blocks for Use at Substations.
(October 23, 1916)
(Supplementing G. E. C. 352)

677 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

678 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

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679 Reducing Couplings.
(November 10, 1916)
(Supplementing G. E. C. 420)
(Supplemented by G. E. C. 873)

680 Long Nose Pliers with Grooves for Twisting No. 17 B. & S. Copper Sleeves.
(November 9, 1916)

681 Clamps.
(November 13, 1916)

682 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250 and 668)

683 No. 58-A Protector—Asbestos Mat to be Included in Code Number.
(November 15, 1916)

684 Modified No. 137 Plug for Use in Testing and Service Observing Circuits.
(November 16, 1916)

685 Specifications for the Replacement and Reinforcement Inspection of Pole Lines.
(December 20, 1916)
(Supplementing Specifications 3522 and G. E. C. 298)

686 National Electrical Safety Code — United States Bureau of Standards.
(November 16, 1916)
(Supplemented by G. E. C. 750)

687 Specifications KS-4—Requirements for Woodwork and Associated Material for Central Office and P. B. X. Equipments and Specifications KS-5—Requirements for Metal Work and Associated Material for Central Office and P. B. X. Equipments.
(November 23, 1916)

688 Aerial Cable Safety Straps.
(December 5, 1916)
(Replacing Specifications 3263)

689 Standard Switchboard and Circuit Drawings.
(December 1, 1916)
(Supplementing G. E. C. 250 and 425)
(Supplemented by G. E. C. 766)

690 Inspection of Material.
(December 18, 1916)
(Supplementing G. E. C. 354)
(Supplemented by G. E. C. 905)

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691 Steel Desk Stands.
(December 5, 1916)
(Supplemented by G. E. C. 913)

692 Discontinuing No. 311 Transmitters.
(December 4, 1916)
(Supplementing G. E. C. 659)

693 Universal Type Key and Keyshelf.
(December 14, 1916)
(Supplemented by G. E. C. 884)

694 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

695 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250 and 425)

696 Cable Grips.
(January 16, 1917)

697 Guy Anchors—Special Types.
(January 25, 1917)
(Supplemented by G. E. C. 796)

698 Crossarm Bolts and Drive Screws.
(January 26, 1917)

699 Transmitting Specifications No. 3791 for Duct Shields.
(February 8, 1917)
(Replacing Specifications 3218)

700 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250 and 425)

701 Galvanizing of Pole Seats and Balconies.
(Supplementing Specifications 1812, 2437, and 2462)

702 Specifications for Tinned Copper Sleeves for Cable Conductors.
(February 26, 1917)
(Replacing G. E. C. 201)
(Supplementing G. E. C. 604)

703 New Head Band for Operators' Receivers.
(February 20, 1917)

704 Tinsel Cords.
(February 27, 1917)

705 Western Electric Company's Code for Paper Insulated Cables.
(March 2, 1917)

706 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

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707 Preliminary Report by the American Committee on Electrolysis.
(March 20, 1917)

708 Specifications for Fir Crossarms.
(March 26, 1917)
(Replacing in part G. E. C. 244 and 583)
(Supplemented by G. E. C. 775)

709 Legal Department Conference Papers—
(a) The Interstate Commerce Commission Valuation.
(b) Interference Cases.
(March 27, 1917)

710 Use of Tungsten in Place of Carbon Lamps as Resistance Lamps.
(April 3, 1917)
(Replacing in part G. E. C. 331)

711 Specifications for Main Frame Protection.
(April 12, 1917)

712 Handbook of Substation Practice.
(April 7, 1917)
(Supplemented by G. E. C. 770, 791, 823, 837, 838 and 865)

713 Sleet Storm Data.
(April 12, 1917)
(Supplementing G. E. C. 574 and 617)

714 Telephone Repeaters.
(May 21, 1917)
(Supplemented by G. E. C. 812, 826, 876, 883, 891, 892 and 971)

715 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

716 Telephone Service at Army Mobilization Camps.
(Replaced by G. E. C. 719)

717 Rubber Tube Protectors for No. 87 Operators' Cords.
(May 3, 1917)

718 No. 4-A Foot Switch for Transmitter Cut-out.
(May 4, 1917)

719 Telephone Service at Army Mobilization Camps.
(Replacing G. E. C. 716)
(Supplemented by G. E. C. 722 and 739)

720 Specifications for Rubber Insulated Lead Covered Cable.
(May 31, 1917)

721 Specifications for Creosoted Yellow Pine Poles.
(May 24, 1917)

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722 Telephone Service at Army Mobilization Camps.
(May 12, 1917)
(Supplemented by G. E. C. 733, 739 and 756)

723 Braided Black Enameled Switchboard Wire.
(May 17, 1917)
(Supplemented by G. E. C. 761)

724 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

725 Specifications for Insulating Tape.
(May 28, 1917)
(Supplemented by G. E. C. 804)

726 Switchboard Lighting.
(June 4, 1917)
(Supplementing G. E. C. 124, 166 and 482)

727 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

728 The Butt Treatment of Poles.
(Supplementing G. E. C. 56)

729 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

730 Installation of "Building-out" Condensers on Open Wire Lines—Specifications No. 3880
(June 29, 1917)
(Replaced in part by G. E. C. 919)
(Supplemented by G. E. C. 924)

731 Report of Telephone Company Activities in Connection with Government Matters.

732 Amendment to Specifications No. 3211—"Stub Reinforcement for Poles."
(June 27, 1917)
(Supplementing G.—C. 81)
(Supplemented by G. E. C. 734 and 792)

733 Telephone Service at Army Mobilization Camps.
(June 27, 1917)
(Supplementing G. E. C. 722)
(Supplemented by G. E. C. 756)

734 Correction of G. E. C. No. 732, Amendment to Specifications No. 3211, "Stub Reinforcement for Poles".
(July 12, 1917)
(Supplementing G. E. C. 732)

735 Double Tube Copper Sleeves.

736 Semi-hard Black Rubber in Place of Leather as a Covering for Piling Blocks and Keyshelf Lamp Rails.
(July 23, 1917)
(Replacing in part G. E. C. 589)

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737 Colored Lamp Caps.
(July 25, 1917)
(Supplemented by G. E. C. 1056)

738 Exposed Line Transposition System.
(August 16, 1917)
(Supplementing G. E. C. 563 and 652)
(Replacing in part G. E. C. 563)
(Supplemented by G. E. C. 816, 871, 915 and 918)

739 Substation Equipment for Army Mobilization Camps.
(August 14, 1917)
(Supplementing G. E. C. 722)

740 Use of 1 Microfarad Condenser in Four-Party Relay Sets.
(August 15, 1917)
(Supplementing G. E. C. 656)
(Supplemented by G. E. C. 857)

741 Strain Insulators for Long Span River Crossings.
(August 28, 1917)
(Replacing Specifications 2077 and 2292)

742 Portable Capacity Bridge.
(August 30, 1917)

743 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

744 Method of Obtaining Ringing Current from Central Office Storage Batteries.
(September 4, 1917)
(Supplementing G. E. C. 612)

745 Specifications for Telephone Power Machines.
(September 7, 1917)
(Replacing G. E. C. 123, 344 and 384)
(Replaced in part by G. E. C. 817)

746 Modification of "A" Operator's Cord Circuit to Facilitate Testing Outgoing Trunk Assignments.
(November 5, 1917)

747 Magneto Switchboard No. 105-B.
(October 10, 1917)
(Supplementing G. E. C. 174 and 565)

748 No. 35 Battery Gauge.
(September 10, 1917)
(Supplementing G. E. C. 246)

749 Test Clips.
(September 6, 1917)
(Supplementing G. E. C. 670)

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750 National Electrical Safety Code.
(September 17, 1917)
(Supplementing G. E. C. 686)
(Supplemented by G. E. C. 814)

751 Substation Protection Specifications.
(September 19, 1917)
(Supplemented by G. E. C. 968)

752 1916 Standard Operator's Chair.
(Supplementing G. E. C. 628)

753 Standard Switchboard and Circuit Drawings.
(Supplementing G. E. C. 250)

754 Mercury Arc Rectifiers for Charging Storage Batteries.
(October 26, 1917)
(Supplementing and replacing in part G. E. C. 542)

755 Standard Power Plant Circuit Conventions.
(October 31, 1917)

756 Telephone Service at Army Mobilization Camps.
(October 18, 1917)
(Supplementing G. E. C. 722 and 733)

757 Standardization of Outside Plant Practices—Specifications for the Construction of Wood Pole Lines Used Jointly for Supply Circuits and Signal Circuits.
(Replacing G.—C. 46)

758 Improved Transmitter for Substation Service.
(October 29, 1917)
(Supplemented by G. E. C. 838)

759 Amendment No. 2 to Specifications No. 3550—Steel Pins for Transposition Brackets.
(November 28, 1917)

760 Strand Connectors.
(December 17, 1917)

761 Protection of Central Offices—Distributing Frame Wire.
(December 13, 1917)
(Supplementing G. E. C. 479 and 723)
(Supplemented by G. E. C. 957 and 1048)

762 Enameled Wire Switchboard Cable.
(December 14, 1917)
(Supplementing G. E. C. 461)

763 Location of the Prepayment Coin Box Service Buttons on Mechanically Locking Keys for Toll Switching Trunks.
(December 24, 1917)
[fol. 15376] (Replacing in part G. E. C. 548 and 647)

764 Meters for Telephone Power Plants.
(December 21, 1917)
(Supplemented by G. E. C. 817)

765 Improvements in Call Circuits and Trunk Operators' Telephone Sets.
(December 27, 1917)
(Replacing in part G. E. C. 271)

766 Standard Switchboard and Circuit Drawings.
(December 20, 1917)
(Supplementing G. E. C. 250, 425 and 689)

767 Connecting Blocks for Nos. 4, 5 and 6 Cable Terminals.
(December 19, 1917)
(Supplementing Specifications 2078)

768 Cable Terminals for Use in Buildings—Standardization of No. 23 Type Cable Terminals, No. 4 Type Distributing Rings and No. 4 Fanning Strips.
(December 26, 1917)
(Supplementing G. E. C. 228 and 415)

769 Step for Use on the Diagonal Brace of Extension Fixtures.
(January 4, 1918)
(Supplementing Specifications 3076)

770 Handbook of Substation Practices—Specifications for Substation Sign Installation.
(January 9, 1918)
(Supplementing G. E. C. 712)
(Supplemented by G. E. C. 862)

771 Short Lengths of Inside Wire.
(Supplementing G. E. C. 621)

772 Standardization of Outside Plant Practices—Specifications 3930. "Drop Wiring".
(January 17, 1918)
(Supplemented by G. E. C. 774, 790, 820, 843 and 881)

773 Location of Supervisors' Equipment on Additions to No. 1 Subscribers' and Trunk Switchboards.
(January 14, 1918)
(Replacing in part G. E. C. 447 and 548)

774 New Materials for Drop Wiring.
(January 28, 1918)
(Supplementing G. E. C. 772)

775 Supply of Crossarms.
(January 31, 1918)
(Supplementing G. E. C. 227, 583 and 708)

776 Use of Explosives.
(April 4, 1918)
(Supplemented by G. E. C. 932)

[fol. 15377]

777 Standard Message Register Racks and Casings—Change in Type of Lock for Sliding Doors.
(February 14, 1918)
(Supplementing G. E. C. 537)

778 Standardization of Outside Plant Practices—Specification 3912 "General Cable Splicing," Specifications 3913 "Underground Cable Splicing" and Specifications 3914 "Aerial Cable Splicing".
(February 11, 1918)
(Supplementing G. E. C. 604)
(Supplemented by G. E. C. 779, 781, 789, 815, 818, 819, 906, 907, 914, 966, 967, 969, 1012 and 1047)

779 Manhole Shields.
(February 15, 1918)
(Supplementing G. E. C. 778)

780 Specifications for Solder.
(February 21, 1918)
(Supplementing G. E. C. 222)

781 Standardization of Outside Plant Practices—Specifications No. 3915 "Block Cable Splicing" and Specifications No. 3916 "House Cable Splicing."
(February 18, 1918)
(Supplementing G. E. C. 778)
(Supplemented by G. E. C. 818)

782 Gas Engines.
(March 1, 1918)

783 Fire Protection—General Precautions and Protective Apparatus.
(March 4, 1918)
(Replacing Special Bulletin A)
(Supplementing G. E. C. 182 and T. C. 50)
(Supplemented by G. E. C. 803)

784 Methods for Supporting and Protecting Conductors at High Tension Crossings.
(March 6, 1918)
(Supplementing G. E. C. 528)

785 Specifications for High Tension Crossings.
(February 28, 1918)
(Replacing G. E. C. 203)
(Supplementing G. E. C. 528)

786 Reinforcing Links.
(March 21, 1918)

787 No. 1-D Switchboard Equipment.
(April 30, 1918)
(Supplemented by G. E. C. 817)

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788 Joint Use of Poles.
(March 21, 1918)

789 Splicers' Contact Points.
(March 28, 1918)
(Supplementing G. E. C. 778)

790 Materials for Drop Wiring.
(April 12, 1918)
(Supplementing G. E. C. 772)

791 One-half Inch Drive Ring.
(April 16, 1918)
(Supplementing G. E. C. 712)

792 Specifications for Creosoted Pine Stubs.
(April 15, 1918)
(Supplementing G. E. C. 732)

793 Specifications for Vitrified Clay Sewer Pipe.
(April 17, 1918)
(Supplementing G. E. C. 386)

794 List of Standard Specifications.
(Replacing G. E. C. 336)

795 Specifications for 2200 Pound Strand.
(April 19, 1918)

796 Patent Guy Anchors.
(April 22, 1918)
(Supplementing G. E. C. 697)
(Supplemented by G. E. C. 1064)

797 Location of Incoming Call Circuit Grouping Keys.
(April 23, 1918)
(Supplementing G. E. C. 271)

798 Binding Posts for Battery and Ground Supply at Floor Type Main Distributing Frames.
(April 24, 1918)
(Supplementing G. E. C. 358)

799 Hand Magazines for Dynamite and Electric Blasting Caps.
(April 24, 1918)

800 Specifications for Wooden Pole Steps and Wooden Pole Brackets.
(April 26, 1918)
(Replaced in part by G. E. C. 1072)

801 Blue Bell Batteries.
(May 1, 1918)

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802 Return of Exhausted Material from No. 502 Primary Batteries.
(May 2, 1918)
(Supplementing G. E. C. 559)

803 Fire Prevention and Protection in Connection with the Construction of Telephone Buildings.
(May 15, 1918)
(Supplements G. E. C. 783)

804 Specifications for Friction Tape.
(May 14, 1918)
(Supplementing G. E. C. 725)

805 Electrolysis.
(May 13, 1918)

806 Color of Cords, Plug Shells, Key Buttons and Associated Lamp Caps for Central Office and Private Branch Exchange Equipments.
(March 17, 1918)
(Replacing in part and supplementing G. E. C. 79, 540 and 837)

807 Manhole Ladders.
(May 23, 1918)
(Supplemented by G. E. C. 921)

808 Peg Count Register Key.
(May 20, 1918)
(Replacing in part G. E. C. 343)
(Supplemented by G. E. C. 1065)

809 Locust Insulator Pins.
(May 20, 1918)
(Supplementing G. E. C. 613 and Specifications 3348)

810 List of Circular Letters & Bulletins.
(Replacing G. E. C. 342)

811 Telephone Equipment in Connection with the General Consolidation of Railroad Ticket Offices.
(May 22, 1918)

812 Telephone Repeaters.
(June 17, 1918)
(Supplementing G. E. C. 714)
(Supplemented by G. E. C. 826, 876 and 926 and T. C. 132)

813 Moisture-proof Desk Stand Cord.
(June 11, 1918)
(Supplemented by G. E. C. 827)

814 High Tension Joint Use.
(June 12, 1918)
(Supplementing G. E. C. 750)

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815 Specifications for Paraffin.
(June 28, 1918)
(Supplementing G. E. C. 778)

816 Paper on Design of Transpositions.
(June 24, 1918)
(Supplementing G. E. C. 738)

817 Standard Power Plants for No. 1-D Central Office Equipment.
(August 15, 1918)
(Supplementing G. E. C. 457, 764 and 787)
(Replacing in part G. E. C. 745)
(Supplemented by G. E. C. 856 and 878)

818 Materials for Cable Work.
(July 18, 1918)
(Supplementing G. E. C. 778 and 781)

819 Resistance Unbalance in Small Gauge Cable Circuits Either Quadded or for Toll Use—Soldering the Joints.
(July 10, 1918)
(Supplementing G. E. C. 778)
(Supplemented by G. E. C. 914)

820 Machine Bolt.
(July 30, 1918)
(Supplements G. E. C. 772)

821 Inductive Interference from Western Union Telegraph Circuits.
(July 23, 1918)
(Supplementing G. E. C. 586 and 652)

822 Standardization of Outside Plant Practices—Specifications No. 3931—"Block Cable Construction".
(July 25, 1918)
(Replacing in part specifications 3235)
(Supplemented by G. E. C. 829, 832 and 1047)

823 Handbook of Substation Practice—Telegraph Substation Installation.
(July 24, 1918)
(Supplementing G. E. C. 712)
(Supplemented by G. E. C. 923)

824 Twisted Pair Rubber covered Wire — Recommended Change in Practice to meet War Requirements.
(Supp. G. E. C. 858, G. E. C. 867)

825 Consecutive X Sections.
(August 13, 1918)
(Replacing in part G. E. C. 652)

826 Telephone Repeater Balance Requirements.
(August 22, 1918)
(Supplementing G. E. C. 714 and 812)
(Supplemented by G. E. C. 869, 926 and 999)
(Replaced in part by G. E. C. 919)

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827 Moisture-proof and Brown Telephone Cords.
(August 20, 1918)
(Supplementing G. E. C. 813)

828 Two-frequency Four-party Selective Ringing System.
(September 5, 1918)

829 Wire Rope Clamp.
(August 26, 1918)
(Supplementing G. E. C. 822)

830 Transmitting Preliminary Draft of First Aid Instructions.
(August 29, 1918)

831 Specifications for Tree Blocks.
(August 27, 1918)

832 Loop Straps.
(August 28, 1918)
(Supplementing G. E. C. 822)

833 Audible Busy Signal for "B" Switchboards.
(September 3, 1918)

834 Specifications for Storage Batteries—Chloride Accumulator Type.
(September 9, 1918)
(Replacing G. E. C. 562)

835 Registry of Water Stills for Storage Batteries.
(September 23, 1918)

836 Method of Making Short Multiple Cable Taps.
(August 30, 1918)

837 Inside Wiring Cleats.
(September 6, 1918)
(Supplements G. E. C. 712)

838 Handbook Specifications No. 3852—Substation Apparatus Installation—Supplement A.
(September 10, 1918)
(Supplementing G. E. C. 712 and 758)

839 New Type Relays to Replace the No. 122 and Similar Relays.
(September 12, 1918)

840 No. 2 Type Lamps for Pilot Signals.
(September 11, 1918)

841 Conversion of No. 84-B to No. 84-E Interrupters.
(September 16, 1918)
[fol. 15382] (Supplementing G. E. C. 381)

842 Inside Wire.
(October 1, 1918)
(Replacing G. E. C. 771)

843 Insulated Screw Eye—Open Type.
(October 15, 1918)
(Supplementing G. E. C. 772)

844 Handbook Covers.
(October 14, 1918)

845 Galvanized Finish for No. 61 Protector Mounting.
(October 17, 1918)

846 Audible Ringing Signal.
(October 24, 1918)
(Supplemented by G. E. C. 1014)

847 Defective Insulation in Rubber Potheads.
(October 23, 1918)

848 Repair of Tinsel Switchboard Cords.
(October 28, 1918)
(Supplementing G. E. C. 429)

849 Toll Test Board No. 4—Improved Open Location Test Circuit.
(November 4, 1918)
(Replacing G. E. C. 167)

850 Composite Ringer Sets—Testing and Adjusting Circuits.
(November 6, 1918)

851 Specifications No. 3778 for 1212—Pair No. 24 Gauge Cable.
(October 29, 1918)
(Supplemented by G. E. C. 996)

852 New Aerial Type No. 22 Gauge Cable—Specifications No. 3800.
(October 31, 1918)
(Replacing G. E. C. 388)
(Supplementing G. E. C. 635)

853 Strand Reel Jack.
(November 27, 1918)

854 Standard Fuse Boards and Subscribers' and Trunk Coil Racks.
(November 15, 1918)
(Supplementing G. E. C. 501)
(Supplemented by G. E. C. 1053)

855 Toll Switchboard No. 2 and Rural Positions at No. 1 Subscribers' Sections.
(November 18, 1918)
(Replacing G. E. C. 48)
(Supplementing G. E. C. 263)

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856 Dry Battery Cabinets.
(November 14, 1918)
(Supplementing G. E. C. 546 and 817)

857 Condensers Used in Subscribers' Sets.
(November 1, 1918)
(Supplementing G. E. C. 656 and 740)

858 Wire for Subscribers Drops.
(Supp. G. E. C. 824)
(Supp. by G. E. C. 867)

859 Contact Material for Telephone Apparatus.
(November 19, 1918)

860 Improved Recall Signals.
(December 27, 1918)

861 Inspection and Testing of the Cable Plant.
(December 31, 1918)

862 Substation Sign Installation—Materials.
(December 13, 1918)
(Supplementing G. E. C. 770)

863 Main Line Telegraph Sounder No. 15-B.
(November 26, 1918)

864 Waxed Switchboard Cords.
(November 25, 1918)
(Supplementing G. E. C. 376)

865 Station Ground Wire Moulding.
(December 12, 1918)
(Supplementing G. E. C. 712)

866 New Finish for Desk Stands.
(November 27, 1918)
(Supplemented by G. E. C. 965)

867 Supplement "A" to Specification 3930—"Drop Wiring".
(Supp. G. E. C. 824 G. E. C. 858)

868 Aerial Cable Guy Rule.

869 Telephone Repeaters Balance Requirements—Revision.
(Supp. G. E. C. 826)

870 Correctness of Loading Testing Set.
(January 30, 1919)

871 Specifications No. 3897—"Preliminary Specifications for Locating Telephone Circuit Transpositions—Exposed Line Transposition System" in Handbook Form.
(December 9, 1918)
(Supplementing G. E. C. 738)

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872 Pipe Ripper.
(January 8, 1919)

873 Castings for Underground Construction.
(December 30, 1918)
(Supplementing G. E. C. 420 and 679)

874 Cable Racks and Hooks.
(January 24, 1919)
(Supplementing G. E. C. 386)

875 No. 14 Ground Wire.
(January 16, 1919)
(Supplementing G. E. C. 662)

876 Portable Cord Circuit Repeater Set.
(January 27, 1919)
(Supplementing G. E. C. 714 and 812)

877 Improper Arrangement of Gas Engine Exhaust Piping.
(January 28, 1919)

878 Electrical Starting of Gas Engines.
(February 5, 1919)
(Supplementing G. E. C. 817)

879 Lithoprint Process of Making Prints and Tracings.
(February 4, 1919)

880 Local Operating Room Desks.
(April 15, 1919)

881 Materials for Drop Wiring.
(February 7, 1919)
(Supplementing G. E. C. 772)

882 Proposed Standard Symbols for Outside Plant.

883 101-B Repeater Bulb—Change in Construction.
(February 14, 1919)
(Supplementing G. E. C. 714)

884 Narrow Base Keys for Manual Ringing Trunks.
(February 21, 1919)
(Supplementing G. E. C. 647 and 693)

885 Cable Reel Trailers.
(March 21, 1919)

886 Standard Traffic Engineering Practices for Local and Toll Central Office Equipments.
(March 11, 1919)
(Supplementing G. E. C. 644)

887 Timing Devices at Recording Boards.
(March 24, 1919)

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888 New Type of Blue Bell Battery.
(March 27, 1919)

889 Tin Coating on Copper Wire.
(April 1, 1919)

890 Pole Dinkeys.
(March 31, 1919)

891 Telephone Repeaters—Improved 21—Circuit Test for Balance.
(March 28, 1919)
(Supplementing G. E. C. 714)
(Supplemented by G. E. C. 1029)

892 Telephone Repeater Equipment—Space Battery Alarm Circuit.
(April 4, 1919)
(Supplementing G. E. C. 714)

893 Repair Clerk's Desk No. 1.
(April 11, 1919)
(Replacing in part G. E. C. 552)

894 Message Register Keys.
(April 7, 1919)

895 Jack Space for Use with No. 118 Lamp Socket Mounting.
(April 9, 1919)

896 Modified No. 25 Tool.
(April 3, 1919)

897 Machine for Boring Pole Holes.
(April 16, 1919)
(Supplemented by G. E. C. 950)

898 Toll Test Board No. 4—Morse Board No. 4.
(June 30, 1919)
(Replacing G. E. C. 233)
(Supplemented by G. E. C. 1053)

899 Decimal Timer Split-Second Stop Watch.
(April 22, 1919)
(Replacing T. C. 10)
(Supplemented by G. E. C. 925)

900 Telephone Interference Factor of Power Voltages.
(May 2, 1919)
(Supplementing G. E. C. 652)
(Supplemented by G. E. C. 1075)

901 Final Report of the Joint Committee on Inductive Interference and General Order No. 52 of the Railroad Commission of the State of California.
(April 29, 1919)
(Supplementing G. E. C. 652)

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902 Standardization of Outside Plant Practices.—Specifications No. 3929—"Aerial Cable Construction".
(June 9, 1919)
(Replacing in part specifications 3235)
(Supplemented by G. E. C. 908, 911, 909, 1010, 1019 and 1047)

903 Standardization of Outside Plant Practices.—Specifications No. 3933—"House Cable Placing."
(May 23, 1919)
(Supplemented by G. E. C. 1047)

904 Portable Resonant Wave Analyzer.
(June 10, 1919)
(Supplementing G. E. C. 652)

905 Inspection of Material.
(June 3, 1919)
(Supplementing G. E. C. 690)

906 Pipe Caps and Pipe Cap Molds.
(June 16, 1919)
(Supplementing G. E. C. 778)
(Supplemented by G. E. C. 1018)

907 Specifications for Cotton Sleeving.
(June 19, 1919)
(Supplementing G. E. C. 778)
(Supplemented by G. E. C. 974)

908 Rope Mat.
(June 20, 1919)
(Supplementing G. E. C. 902)

909 Aerial Cable Guide.
(June 21, 1919)
(Supplementing G. E. C. 902)

910 Wire Type Head Bands for Operators' Receivers.
(June 11, 1919)

911 Trolley and Tree Guards.
(June 17, 1919)
(Replacing in part G. E. C. 274)
(Supplementing G. E. C. 902)
(Replaced in part by G. E. C. 973)

912 Change in A1S Blackburn Ground Clamps.
(June 13, 1919)
(Supplemented by G. E. C. 1040)

913 Use of Steel Desk Stands to Obtain Maintenance Economies.
(July 2, 1919)
(Supplementing G. E. C. 691)

914 Standardization of Outside Plant Practices—Specifications No. 3912—General Cable Splicing, Supplement A.
(July 3, 1919)
(Supplementing G. E. C. 778 and 819)

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915 Coefficients of Induction Between Power Circuits and Telephone Circuits.
(March 19, 1920)
(Supplementing G. E. C. 652 and 738)

916 No. 8 Cable Terminals.
(July 14, 1919)

917 Nos. 26 and 27 Protector Blocks.
(July 28, 1919)
(Supplemented by G. E. C. 935)

918 "Square Phantom" Telephone Circuits.
(July 31, 1919)
(Supplementing G. E. C. 738)

919 Standardization of Open Wire and Office Type Building-out Condensers.
(August 13, 1919)
(Replacing in part G. E. C. 730 and 826)

920 Transmitting Specifications No. 4018—First Aid.
(September 2, 1919)

921 Manhole Ladders.
(September 18, 1919)
(Supplementing G. E. C. 807)

922 New Induction Coil for Subscribers' Sets.
(October 7, 1919)

923 Telegraph Sounders No. 3-B and No. 3-C—Code Numbers.
(October 10, 1919)
(Supplementing G. E. C. 823)

924 Installation of "Building-out" Condensers on Open Wire Lines—Specifications No. 4024, Supplementing Specifications No. 3880.
(October 29, 1919)
(Supplementing G. E. C. 730)

925 Hundred Second Timer—100 Second Dial Split Second Stop Watch Direct Reading in Seconds.
(December 8, 1919)
(Supplementing G. E. C. 899)

926 Tandem Operation of Telephone Repeaters.
(December 18, 1919)
(Supplementing G. E. C. 812 and 826)

927 New Operator's Receiver.
(December 26, 1919)

928 Standardization of Outside Plant Practices.—Specifications Nos. 4033—Tree Pruning.
(December 30, 1919)
(Replacing G. E. C. 346 and Specifications 4002)

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929 Furnace Shield.
(January 14, 1920)

930 Specifications No. 4036 "Thimbles."
(January 15, 1920)
(Replacing Specifications 3077)
(Supplementing G. E. C. 276)

931 Clamps for Cables and Ground Wires.
(January 19, 1920)
(Replacing G. E. C. 620)
(Supplemented by G. E. C. 958)

932 Handling of Explosives.
(January 13, 1920)
(Supplementing G. E. C. 776)

933 Use of Series Multiple Pothead on Jointly Used Poles.
(January 23, 1920)

934 Standardization of "B Cable Terminal".
(January 21, 1920)

935 Nos. 26 and 27 Protector Blocks—Reduced Substation and Central Office Maintenance.
(January 26, 1920)
(Supplementing G. E. C. 917)

936 Paper on Telephone Repeaters.
(January 22, 1920)

937 U Cable Guards.
(January 30, 1920)

938 Standardization of Outside Plant Practices—Specifications No. 4032, "Underground Cable Placing."
(January 27, 1920)
(Supplementing G. E. C. 604)

939 Floor Outlet for Protecting Inside Wires and Cables.
(February 13, 1920)
(Supplementing specifications 3853)

940 Requirements for Repaired Gondensers Employing Paper Dielectric.
(February 10, 1920)

941 Line Impedance Measuring Apparatus.
(February 16, 1920)
(Supplemented by G. E. C. 1062)

942 C. S. Ground Clamp.

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943 Specifications for Insulator Pins.
(February 18, 1920)

944 Cable Balconies and Pole Seat.
(February 19, 1920)
(Replacing specifications 1812, 2437 and 2462 and G. E. C. 701)
(Supplemented by G. E. C. 991 and 1019)

945 Designation of Wires and Sleeves.

946 Supply of Types F, G, and U Cables.
(March 15, 1920)

947 Standardization of Outside Plant Practices.—Specifications No. 3932—"Block Wiring."
(March 16, 1920)
(Replacing in part specifications 3235)

948 Standard Symbols for Outside Plant.
(March 17, 1920)
(Replacing G. E. C. 882)

949 Wooden Pole Brackets and Pole Steps.
(March 19, 1920)
(Replaced in part by G. E. C. 1072)

950 Earth Boring Machines.
(April 5, 1920)
(Supplementing G. E. C. 897)

951 Transmitting Specifications No. 4006—Transposition Glass Insulators.
(April 6, 1920)

952 No. 6F Connecting Block (13 pair) and No. 6 Fanning Strip (13 Pair).
(April 7, 1920)

953 Eye Bolts and Eye Nuts.
(April 12, 1920)

954 Grade Clamps.
(April 29, 1920)

955 B Booster Hook.
(April 30, 1920)

956 Transmitting Specifications and Drawings for B, C and D First Aid Kits.
(May 17, 1920)
(Supplemented by G. E. C. 1015)

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957 Distributing Frame Wire.
(May 3, 1920)
(Supplementing G. E. C. 761)
(Supplemented by G. E. C. 998)

958 Bridle Rings for Cable Clamps.
(May 4, 1920)
(Supplementing G. E. C. 931)

959 Magneto Subscribers' Sets Employing 2500-ohm Ringers of the No. 8 Type.
(May 5, 1920)

960 Cable Extension Arms.
(May 6, 1920)

961 Thimble Guy Rods.

962 Porcelain Strain Insulators.
(May 18, 1920)

963 Reinforcing Strap.
(May 14, 1920)

964 Transmitting Specifications No. 4069, "Houseline."
(May 19, 1920)

965 Substation Equipment—General Use of Black Finish.
(May 11, 1920)
(Supplementing G. E. C. 866)

966 Standardization of Outside Plant Practices—Specifications No. 3912—General Cable Splicing—Wax Thermometer.
(May 24, 1920)
(Supplementing G. E. C. 778)

967 Standardization of Outside Plant Practices—Specifications No. 3914—Aerial Cable Splicing. Supplement A.
(June 1, 1920)
(Supplementing G. E. C. 778)

968 New Substation Protector—For Use Where Lines Enter Substations in Cable.
(June 4, 1920)
(Supplementing specifications 3850 and G. E. C. 751)

969 Standardization of Outside Plant Practices—Specifications No. 3914—Aerial Cable Splicing—Splicers' Tent.
(May 28, 1920)
(Supplementing G. E. C. 778)

970 Bridle Wire Insulator.
(June 7, 1920)
(Replacing G. E. C. 190)

971 Vacuum Tube Repeater Sockets.
(June 3, 1920)
(Supplementing G. E. C. 714)

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972 Modifications of No. 4-A Buzzer.
(June 11, 1920)
(Supplementing G. E. C. 465)

973 Trolley Guards.
(June 14, 1920)
(Replacing in part G. E. C. 911)

974 Specifications for Cotton Sleeving.
(June 15, 1920)
(Supplementing G. E. C. 907)

975 Standardization of Outside Plant Practices.—Specifications No. 4040 "Construction of Jointly Used Wood Pole Lines."
(June 17, 1920)
(Replacing G. E. C. 757 and specifications 3921)

976 Specifications No. 3935—New Designations for Wires and Sleeves.
(June 23, 1920)
(Replacing G. E. C. 945)

977 Carrying Case for Protector Blocks.
(June 25, 1920)

978 Discontinuing Specifications No. 3930 "Drop Wiring" Supplement "A".
(June 28, 1920)
(Replacing G. E. C. 824, 858 and 867)

979 Bulletin on Sags and Tensions of Suspension Strand for Aerial Cable.
(June 29, 1920)

980 Spout Strap.
(June 26, 1920)

981 Cable Terminal Wire.
(June 30, 1920)

982 Non-Multiple Private Branch Exchange Switchboards for Operation with Machine Switching Central Offices.
(July 1, 1920)
(Supplemented by G. E. C. 997 and 1036)

983 Pulling Up Clamp.
(July 12, 1920)

984 Rock Guy Anchors.
(July 19, 1920)

985 (Discontinuing Specifications No. 2770).
(July 21, 1920)

986 Underground Conduit Construction—Specifications 4104 "Creosoted Wood Conduit", and Specifications 4105, "Creosoted Plank".
(July 22, 1920)
(Supplementing G. E. C. 24 and —)

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987 Substation Installation—Improved Inside Wiring Nail.
(August 27, 1920)

988 Machine Switching Substations—Transmitting Preliminary Specifications No. 4100.
(August 27, 1920)
(Supplemented by G. E. C. 1011, 1013 and 1078)

989 Steel Cable Crossarm.
(August 27, 1920)

990 Specifications for Dowel Pins.
(August 30, 1920)

991 Braces for F. X. Terminals.
(September 24, 1920)
(Supplementing G. E. C. 944)
(Supplemented by G. E. C. 1019)

992 Central Office Names for Use in Machine Switching Exchanges.
(September 30, 1920)

993 Body Belt and Safety Strap.
(September 27, 1920)

994 Magnet Substations—Abandoning the No. 12-A and 12-AP Protectors.
(October 8, 1920)

995 No. 317 Magneto Type Subscribers' Sets—Use of Desk Stand Transmitter.
(October 1, 1920)

996 24 Gauge Cable.
(October 15, 1920)
(Supplementing G. E. C. 851)

997 Non-Multiple Private Branch Exchange Switchboards for Operation with Machine Switching Central Offices—No. 550-SC Switchboard.
(October 27, 1920)
(Supplementing G. E. C. 982)

998 Distributing Frame Wire—Amendment No. 1 to Specifications 4056.
(November 3, 1920)
(Supplementing G. E. C. 957)
(Supplemented by G. E. C. 1048)

999 Precision Type Basic Networks.
(November 5, 1920)
(Supplementing G. E. C. 826)

1000 Ground Rods.
(December 13, 1920)
(Supplementing G. E. C. 650)

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1001 Pipe Straps.
(November 30, 1920)

1002 Standard Operators' Chairs.
(December 1, 1920)
(Replacing G. E. C. 628 and 752)
(Supplementing G. E. C. 189)

1003 Changes in Subscribers' Numbers in the Series 1 to 999 Due to Introduction of Machine Switching Equipment.
(December 20, 1920)

1004 Modifications in Cord Equipment at Outward Toll Positions.
(December 18, 1920)

1005 Machine Switching Publicity Memoranda—Initial Zeros. General Information for All Employes.
(December 23, 1920)

1006 Changes in No. 135 Plug.
(December 28, 1920)

1007 Cable Suspension Clamps.
(January 11, 1921)
(Supplementing specifications 3326)

1008 Manhole Guard.
(January 3, 1921)

1009 Glass Insulators.
(January 10, 1921)
(Replacing G. E. C. 160)

1010 Standardization of Outside Plant Practices.—Spec. No. 3927 "Guying".
(January 13, 1921)
(Supplementing G. E. C. 165, 674 and 902)

1011 Machine Switching Substations—Instruction Cards for Dials.
(January 15, 1921)
(Supplementing G. E. C. 988)

1012 Standardization of Outside Plant Practices—Specifications No. 3912—"General Cable Splicing." Supplement B.
(January 15, 1921)
(Supplementing G. E. C. 778)

1013 Machine Switching Substations—Installing Subscribers' Sets with Dial.
(January 17, 1921)
(Supplementing G. E. C. 988)

1014 No. 59 Type Condensers.
(January 19, 1921)
(Supplementing G. E. C. 846)

1015 "B" First Aid Box.
(January 17, 1921)
(Supplementing G. E. C. 956)

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1016 Metal Subscribers' Sets.—New Writing Shelf.
(January 21, 1921)
(Supplementing G. E. C. 593)

1017 Outline of Special Work in Connection with the Cutover of a Machine Switching Office.
(January 25, 1921)

1018 Pipe Cap Molds.
(February 17, 1921)
(Supplementing G. E. C. 906)

1019 Standardization of Outside Plant Practices—Specifications No. 3929, Appendix 1—Aerial Cable Construction—Use of B and C Cable Balconies with FX Terminals.
(January 27, 1921)
(Supplementing G. E. C. 902, 944 and 991)

1020 Type C Porcelain Knobs.
(February 1, 1921)
(Supplementing G. E. C. 642)

1021 Standardization of Outside Plant Practices—Specifications No. 4131—Use of Dynamite.
(February 1, 1921)
(Replacing G. E. C. 489)

1022 Specifications for Chestnut Poles.
(February 3, 1921)

1023 Cutover of Machine Switching Offices—Temporary Operator's Positions.
(February 7, 1921)
(Supplemented by G. E. C. 1058)

1024 Standardization of Outside Plant Practices—Specifications No. 3930, Drop Wiring, Appendix 1—Multiple Fusing in Underground Cable Terminals.
(February 9, 1921)

1025 Reduction in Thickness of Cable Sheath.
(February 18, 1921)

1026 Sleeve Twisters.
(February 15, 1921)

1027 Tinned Steel Sleeves.
(February 23, 1921)
(Replacing G. E. C. 603)

1028 Transposition Running Board.
(February 16, 1921)

1029 Telephone Repeaters—Improved 21 Circuit Test.
(February 15, 1921)
[fol. 15395] (Supplementing G. E. C. 891)

1030 Guy Rule.
(February 19, 1921)
(Replacing G. E. C. 868)

1031 Carrier Current Systems.
(February 11, 1921)
(Supplemented by G. E. C. 1046)

1032 W. P. Wire.
(February 24, 1921)
(Replacing G. E. C. 234)

1033 Transmission Testing Apparatus—Coding System.
(February 25, 1921)

1034 Use of 1-A Transmission Measuring Set by Railroad Companies and Connecting Telephone Companies.
(February 25, 1921)
(Supplementing G. E. C. 634)

1035 Copper Wire and Sleeves.
(March 4, 1921)
(Replacing G. E. C. 735)

1036 Maintenance Information Covering Private Branch Exchange Switchboard No. 550-C.
(March 29, 1921)
(Supplementing G. E. C. 982)

1037 Telephone Service Between the United States and Cuba.
(February 26, 1921)

1038 Specifications for Muslin.
(March 15, 1921)

1039 C. L. Tree Wire.
(March 21, 1921)

1040 A I S Ground Clamp—Change in Size of Locknut.
(March 16, 1921)
(Supplementing G. E. C. 912)

1041 Bridle Rings.
(March 22, 1921)

1042 Mechanical Toll Ticket Distributing System.
(March 28, 1921)

1043 New Substation Coin Collector Circuit to Reduce Beating at Two-party Selective and Four-Party Semi-selective Stations Having Desk Stands.
(March 24, 1921)

1044 Standardization of Outside Plant Practices—Specifications No. 4131, "Use of Dynamite", Appendix 1, Blasting with Burning Fuse.
(March 28, 1921)

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1045 Preservative Treatment for Pole Butts.
(June 6, 1921)
(Replacing G. E. C. 728)

1046 Paper on Carrier Current Telephony and Telegraphy.
(April 4, 1921)
(Supplementing G. E. C. 1031)

1047 Standardization of Outside Plant Practices—Supplementing Specifications Relative to the Use of 24 Gauge Cable.
(April 9, 1921)
(Supplementing G. E. C. 778, 822, 902 and 903)

1048 Enameled Distributing Frame Wire—Change in Coil.
(April 21, 1921)
(Supplementing G. E. C. 761 and 998)

1049 No. 146 Tool for Removing Lamp Caps and Number Plates.
(April 29, 1921)

1050 No. 60-Type Designation Strip.
(April 30, 1921)

1051 No. 5 and No. 6 Type Signal Plugs.
(May 3, 1921)
(Supplementing T. C. 55)

1052 Eastern White Cedar Poles.
(May 6, 1921)

1053 Improved Heat Coil for Morse Battery Leads.
(May 9, 1921)
(Supplementing G. E. C. 854 and 898)
(Replacing G. E. C. 95)

1054 Spring Tweezers—No. 149 Tool.
(May 14, 1921)

1055 Holder for Key Sleeves Used at "A" Operators' Positions.
(May 16, 1921)

1056 Colored Lamp Caps.
(May 20, 1921)
(Supplementing G. E. C. 737)

1057 Designation Strips—Modifications in No. 8 Type.
(May 28, 1921)
(Supplementing G. E. C. 317)

1058 Cutover of Machine Switching Offices—Temporary Operators' Positions.
(June 3, 1921)
(Supplementing G. E. C. 1023)

[fol. 15397]

1059 Machine Switching Substations—Instructing Party Line Subscribers How to Make Reverting Calls.
(June 13, 1921)

1060 B Drop Wire.
(June 17, 1921)

1061 Ticket Holders for Use at Outward Toll Positions.
(June 22, 1921)

1062 Line Impedance Measuring Apparatus.
(June 21, 1921)
(Supplementing G. E. C. 941)

1063 Handbook of Central Office Telegraph Practice.
(June 20, 1921)

1064 Thimble Guy Rods.
(June 27, 1921)
(Supplementing G. E. C. 796)
(Replacing G. E. C. 961 and Specifications 3950)

1065 Peg Count Register Key—Vertical Type.
(June 28, 1921)
(Supplementing G. E. C. 808)

1066 Method of Estimating Inter-office Trunk Requirements.
(July 22, 1921)

1067 Telegraph Substations—Head Type Sounder.
July 25, 1921)

1068 Strain Plates.
(July 29, 1921)
(Replacing Specifications 3213)

1069 Substitution of Phenol Fibre for Micanite for the Bases of No. 35 and Similar Type Fuses.
(August 1, 1921)
(Supplementing G. E. C. 152 and 526)

1070 CS Ground Clamp.
(August 10, 1921)
(Replacing G. E. C. 942)

1071 Improvements in Construction of No. 20-A Test Set.
(August 12, 1921)
(Supplementing G. E. C. 608

1072 Wooden Pole Brackets.
(August 18, 1921)
(Replacing in part G. E. C. 800 and 949)
(Replacing Specifications 3972 and Amendment 1 to 3972)

[fol. 15398]

1073 Stubbing Bolts.
(August 22, 1921)

1074 Historical Data on the Development of the Telephone Art.
(August 25, 1921)

1075 Calibration of Apparatus for Measurement of Telephone Interference Factor of Voltage.
(August 20, 1921).
(Supplementing G. E. C. 900)

1076 Method of Operation of Step-by-Step Machine Switching Equipment.
(September 1, 1921)
(Replaced in Part and Supplemented by G. E. C. No. 1386)

1077 Maximum Potential on Conductors Leased to the Western Union Telegraph Company.
(August 20, 1921)
(Supplementing G. E. C. 586)
(Supplemented by G. E. C. #1215)

1078 New Apparatus Blank for Machine Switching No. 50 Type Coin Collectors.
(August 23, 1921)
(Supplementing G. E. C. 988 and Supplemented by G. E. C. 1101)

1079 Maintenance Information Governing Stromberg-Carlson Relays in Private Branch Exchange Switchboard No. 550-AC.
(Supplementing G. E. C. No. 997)
(Supplementing G. E. C. 1036)
(Transmits Supp. to Bulletin No. 16 Subject same as G. E. C.)

1080 Long Handled Shovels and Digging Spoons.
(August 30, 1921)

1081 Non-Multiple Cordless P. B. X. for Operation with Machine Switching Central Offices—No. No. 505-C.
(August 29, 1921)

1082 No. 50 Prepayment Type Coin Collector—Steel Housing Construction.
(August 26, 1921)

1083 Service Observing Equipment for Use With Machine Switching Central Offices.
(Sept. 8, 1921)
(Transmits Notes)

1084 Transmission Tests on Manual Exchange Area Circuits and Equipment. Supplements G. E. C. 634
(Sept. 7, 1921)

[fol. 15399]

1085 Amendment No. 3 to Specifications No. 3647—Reducing Couplings Supplementing Specifications No. 3647.
(Sept. 19, 1921)

1086 List of Circular Letters and Specifications. Replacing G. E. C.'s Nos. 810 and 794.
(Sept. 1, 1921)

1087 Page Printing Telegraph System Employing Type Bar Printer and Associated Apparatus.
(October 17-21)
(Transmits Bulletin #39 Subject same as G. E. C.)
(Supplemented by G. E. C. No. 1170.)

1088 Condenser Arrangement for Neutralizing Crossfire Between Open-Wire Telegraph Circuits.
(Sept. 19, 1921)
(Transmits Bulletin #33)

1089 Galvanized Pole Stops—Replacing Specifications #3295—Replacing in part G. E. C. #276.
(Oct. 11, 1921)
(Transmits Spec. 4146)

1090 "B" Guy Shield
(Oct. 3, 1921)
(Transmits Drwg. #46-M-29)
(Replaced by G. E. C. No. 1182)

1091 Construction Chains—Replacing Specifications #3111 and 4073.
(Oct. 4, 1921)
(Transmits Specs. 4148)

1092 Numbering of Line Registers.
Supplementing G. E. C. #395
(Oct. 6, 1921)

1093 Six Pair No. 6-G Connecting Block.
(Oct. 26, 1921)
(Transmits Drwg. 38-Y-1338)

1094 Inspection and Testing of the Cable Plant—Revised Cable Trouble Record Form—Supplementing G. E. C. #861.
(Oct. 24, 1921)
(Transmits Specs. 4141 and 4142 in Handbook form)

1095 No. 493-B Peg Count Register Key Replacing G. E. C. #808.
(Oct. 28, 1921)
(Transmits Drwg. 38-Y-1232)

1096 Standardization of Outside Plant Practices—Specifications No. 4157 "Cable Protection"
(Nov. 3, 1921)
(Supplemented by G. E. C. No. 1151)

1097 Improved Single and Double Pulley Cord Weights and Cord Pulley. Replaces G. E. C's 129 and 196.
(Nov. 1, 1921)

[fol. 15400]

1098 One Bolt Clamp. Replacing G. E. C. #829.
(Nov. 2, 1921)
(Transmits Spec. #4151 and Drwg. 46-L-29)

1099 Amendment No. 2 to specifications 3440 "50-50 Solder".
Supplements G. E. C.'s Nos. 222 and 780.
(Nov. 11, 1921)
(Transmits Amend. #2 Spec. 3440)

1100 Tinned Copper Sleeve for Cable Conductors.
Supplementing G. E. C. No. 702.
Replacing Spec. No. 3817.
(Dec. 9, 1921)

1101 Machine Switching Substations. Transmitting Specifications No. 4160. Supplementing G. E. C. No. 988 and 1078.
(Dec. 19, 1921)
(Supplemented by G. E. C. #1312)

1102 Improved Open Space Cutout for the Main Distributing Frame Protector which Mounts on 3/8" Centers.
Supplementing G. E. C. No. 917.
(Jan. 5, 1922)

1103 Sleet Storm Map.
(Jan. 4, 1922)
(Transmits Map of U. S. Showing Sleet Storm Areas)

1104 3-A Transmission Measuring Set.
(Jan. 12, 1922)
(Transmits Bulletin #35 subject as above)

1105 Short Lengths of Inside Wire. Replacing G. E. C. No. 842.
(Transmits Amendment #2 to Spec. #3805)
(Jan. 10, 1922)

1106 Braces for F. X. Terminals. Supplementing G. E. C. No. 991.
(Transmits Issue 2—Drwg. No. 46-L-51)
(Jan. 9, 1922)

1107 Improvements in Operator's Set.
(Jan. 6, 1922)

1108 Paraffin Pots.
(Jan. 17, 1922)
(Transmits Drwg. 46-M-66 and 46-M-68)

1109 No. 4 and No. 6 Bridging Connectors.
(Jan. 23, 1922)
(Transmits Drwg. 46-L-97 = No. 6 connector, Drwg. 46-L-98 = No. 4 connector)

1110 Substation Soldering Copper Heater.
(Jan. 24, 1922)
(Transmits Drwg. 38-Y-1331 Heater, Drwg. 38-Y-1330—Alcohol (fuel) container and Drwg. 38-Y-1385—Substation Soldering Copper)

1111 Fuse Wrench (#216 Tool) January 24, 1922.
(Transmits Drwg. 95-E-69)

[fol. 15401]

1112 Washers. Replacing Spec. No. 3078. Replacing in part G. E. C. No. 276.
(Feb. 14, 1922)
(Transmits Spec. 4149)
(Supplemented by G. E. C. #1367)

1113 Standardization of Outside Plant Practices. Specifications 4032. Underground Cable Placing. Supplement A.
(Feb. 2, 1922)
(Transmits Handbook Spec. 4032—Supp. A)

1114 4-A Transmission Measuring Set.
(Feb. 24-22)
(Transmits Sect. 1-B of Part II—Subject Description of 4-A Transmission Measuring Set)

1115 D. P. Insulator. Supplementing G. E. C. #1009.
(Feb. 15, 1922)
(Transmits Issue 3 Drwg. #46-L-20)

1116 Underground Construction. Forms for Concrete Manholes.
(Feb. 28-22)
(Transmits, "Notes: Construction of Concrete Manholes" also drwgs. 142-A-47, 48, 55, 143-A-1, 2, 3 and 194-B-53, 54 and Appendix "Analysis of Cost of Brick and Concrete Manholes")

1117 Method of Assigning Lines and Trunks. Panel Machine Switching Equipment.
(Feb. 20-1922)

1118 Six-pair Metal Building Terminal Box. Supplementing G. E. C. 1093.
(Feb. 21-1922)
(Transmits Drwg. 188-B-76)

1119 Abandonment of Practice of Providing No. 10 B. & S. Gauge Conductors in Toll Entrance Cables.
(Mar. 16-1922)
Superseding in part G. E. C. No. 253.

1120 Wooden Apparatus Blanks.
(Feb. 22-1922)
(Transmits Drwg. 38-Y-1177)

1121 Half Round Wooden Moulding.
(Mar. 4-1922)
(Transmits Drwg. 90-E-8)
(Replaced by G. E. C. #1296)

1122 Cable Clamps. Supplementing G. E. C. #931.
(Mar. 6-1922)
(Transmits Drwg. 46-L-114)

1123 One Sheave Cable Block.
(Mar. 6-1922)
(Transmits Drwg. 140-A-73)

1124 Rosin Core Solder. Supplementing G. E. C. Nos. 222 and 780.
(Mar. 7-1922)
[fol. 15402] (Transmits Spec. No. 4152)

1125 Standardization of Long Cords for Use at Substations.
(Mar. 23-22)
(Supplemented by G. E. C. 1258)

1126 Standardization of Porcelain Type Open Space Cutout and Nos. 83-A and 84-A Protector Mountings.
(Mar. 28-22)
Replacing G. E. C. Nos. 185 and 452.
(Transmits Bulletin #45 Porcelain Type Open Space Cutouts for Cable Protection and Bulletin #47 Protector Mountings No. 83-A and 84-A)
(Supplemented by G. E. C. No. 1157)

1127 Specifications No. 4063 for 455—Pair 19-Gauge Cable.
(Mar. 24-22)
(Transmits Specifications #4063 as Per Above)

1128 Machine Switching Substations—Transmitting Specifications Covering Maintenance of Automatic Electric Company Dials at Substations.
(Mar. 27-22)
(Transmits Handbook Spec. 4159 Subject As Above)

1129 Improved Window Frame for No. 10-A Message Register.
(Mar. 29-22)
Supplementing G. E. C. No. 594.

1130 Stencil Paints.
(Mar. 31-22)
(Transmits Specs. #4167, Black Paint and 4168, Orange Paint)

1131 Relay Contact Burnisher—No. 265 Tool.
(Apr. 3-22)
(Note: No. 266 Tool Also Included Which Is a Repair Part, Blade only)

1132 Tinned Steel Sleeves—Amendment No. 1 to Specifications No. 4137.
(Mar. 30-22)
Supplementing G. E. C. No. 1027.
(Transmits Amendment #1 to Spec. 4137)
(Supp. by G. E. C. 1382)

1133 Eastern White Cedar Poles.
(Mar. 29-22)
(Replaced G. E. C. 1052)
(Transmits Amendment #2 to Spec. 3254)

1134 Standardization of Outside Plant Practices—Specification No. 3928 "Open Wire Construction". Supplementing G. E. C. No. 431 and 674.
(Mar. 30-22)
(Transmits Handbook Spec. #3928 Subject As Above)

1135 3-A Oscillator.
(Apr. 6-22)

1136 Specifications for Chestnut Poles.
Replacing G. E. C. No. 1022.
(Apr. 7-22)
(Transmits Spec. #4166, Subject As Above, Which Replaces Spec. #4138)
(Supplemented by G. E. C. #1379)

1137 No. 50-A Repeating Coil.
(Apri. 4-22)
Replaces in Part G. E. C. #54 and Supplements G E. C.'s Nos. 462 and 523.
[fol. 15403] (Supplemented by G. E. C. #1178)

1138 Improvement in Design of Splicers' Contact Points.
(Apr. 17-22)
Replacing G. E. C. No. 738.
Replacing Drawing #4-E-13.
Replacing Drawing #179-B-64.
(Transmits Drawing 46-L-95 Splicers Test Point and Drawing 46-L-106 Needle Point Test Pick)

1139 Improved Cross-Connecting Ring for "B" Cable Terminal.
Supplementing G. E. C. No. 934.
(Apr. 19-22)
(Transmits Drawing 46-B-52)

1140 Snatch Block.
(Apr. 29-22)
(Transmits Illustration of Block)

1141 7-A and 7-B Oscillators.
Replaces in part G. E. C. No. 473.
(Apr. 25-22)
(Transmits Bulletin #30)

1142 Telephone Attachments at Substations.
Supplementing G. E. C. No. 66.
(Apr. 14-22)

1143 Substation Transmitter for use on Long Loops.
(Apr. 12-22)

1144 High Impedance Ringer to reduce inductive noise on two-party selective and four-party semi-selective lines.
(Apr. 24-22)

1145 Public Telephone Stations—Open Type Telephone Booths.
(Apr. 14-22)
(Transmits Drwg. 144-A-21 and 144-A-22 Provisional Drwgs.)

1146 Form for Record of Explosives.
Supplementing G. E. C. 1021.
(Apr. 21-22)
(Transmits Copy of Form E-260)

1147 Pheonal-Fibre Tops for Horizontal Type Keys with Indicators.
(Apr. 26-22)

1148 Telephone Attachments at Substations.
Supplementing G. E. C. No. 1142.
(May 5-22)
(Transmits Photograph)

1149 No. 50 Coin Collector Maintenance—Transmitting Handbook Specifications 3858.
(May 4-22)
(Transmits Handbook Spec. #3858 and Form E-158 Out of Order Card)

1150 Cabinets for Storage of Operators' Telephone Sets.
(Transmits Drwg. 143-A-57)
(May 15-22)

1151 Standardization of Outside Plant Practices—Transmitting Supplement A to Specifications No. 4157. "Cable Protection".
Supplementing G. E. C. No. 1096.
[fol. 15404] (May 9-22)

1152 Strength of Old Eastern White Cedar Poles.
May 24-22.
(Transmits Bulletin #49)

1153 Toll and Exchange Glass Insulators.
(May 17-22)
Supplementing G. E. C. 1009.
(Transmits Issue 3 of Drawings 46-L-19 and 46-L-52)

1154 Earth Boring Machines.
Supplementing G. E. C. #950.
(May 16-22)

1155 Sub-station Number Plates.
(May 22-22)
(Supplementing G. E. C. No. 369)

1156 M. D. F. Test Plug No. 206.
(May 26-22)
(Note: No. 716 and 733 cords also mentioned)

1157 Improvements in No. 8 Terminals.
(May 27-22)

1158 Porcelain Strain Insulators.
(May 31-22)
Supplementing G. E. C. #962.
(Transmits Amend. #1 to Spec. 4041)
(Replaced by G. E. C. No. 1316)

1159 Switchboard Cords—Abandonment of Waxing.
Replacing G. E. C. No. 864.
(May 25-22)

1160 No. 2-A Repeater Gain Set—Bulletin No. 27.
(June 2-22)
(Transmits Bulletin No. 27)

1161 Manhole Cover Hook.
(June 6-22)
(Transmits Drwg. 46-M-87)

1162 Standardization of Outside Plant Practices—Specifications 4171 "Underground Conduit for Service Connections".
(June 1-22)
(Transmits Handbook Spec. 4171)

1163 Cable Splicing Operations in Machine Switching Areas.
Supplementing G. E. C. No. 778 and Spec. No. 3912.
(June 9-22)
(Transmits Supp. E to Spec. 3912 to handbook form)

1164 1-A Composite Set Bridge.
(June 21-22)
(Transmits Bulletin No. 32—Same Subject)

1165 5-A Carrying Case.
(June 21-22)
(Transmits Drwg. 904-632)

[fol. 15405]

1166 Key West—Havana Cables.
(June 12-22)
(Transmits Paper on above cable)

1167 Auxiliary Receivers for Use at Substation.
(June 19-22)

1168 Improved Phantom Repeating Coils.
(June 16-22)
Replacing in Part G. E. C. 371—Supplementing G. E. C. 826.
(Transmits Bulletin #53 Subject Same as G. E. C.)
(Replaced by G. E. C. #1339)

1169 Routine for the Inspection of Operators' Telephone Sets.
(Transmits Sect. IV-B of Transmission Practices)
(June 24-22)

1170 Maintenance of Printing Telegraph Apparatus.
(July 5-22)
Supplementing G. E. C. #1087.
(Transmits "Bulletin No. 50—Maintenance Information Regarding Printing Telegraph Sets Employing Type Bar or Type Wheel Printers)
"Notes on Printing Telegraph Maintenance Practices" dated March 30-1922.
"Notes on Training of Printer Maintenance Men" dated March 30-1922.
(Supplemented by G. E. C.'s No. 1262 and 1387)

1171 Machine Switching Sub-stations—New Dial Cord for Desk Stands.
(June 26-22)
Supplements G. E. C. No. 988.

1172 Metal Subscribers' Sets—Change in Construction of Base.
(June 28-1922)
Supplements G. E. C. 593 in part.
(Transmits photograph of old and new type sets)

1173 Standardization, of Sub-station Practices—Specifications No. 4170 Sub-station and Private Branch Exchange. Protector Installation.
(Transmits Handbook Spec. #4170)
(June 27-22)
(Supplemented by G. E. C. No. 1251)

1174 Small Gauge Non-Quadded Cables Manufactured with Staggered Pair Twist.
(June 29-22)
(Supplemented by G. E. C.'s Nos. 1266, 1284 and 1346)

1175 Machine Switching—Maintenance of Dials at Sub-stations and Central Offices.
(July 6-22)
Supplements G. E. C. No. 988.
(Transmits Instructions covering "Maintenance of Western Electric Company No. 2 Type Dials Used at Central Offices, and Large Private Branch Exchanges)
(Supplemented by G. E. C. 1260)

[fol. 15406]
1176 Public Telephone Stations: Booth Lamp Guard.
"Transmits Drwg. 143-A-56".
(July 1-22)

1177 Power Pumps.
(July 17-22)
(Transmits Specifications #4178 (Handbook form) "Operation of Power Diaphragm Pump")

1178 Price of No. 50-A Repeating Coil.
(June 30-22)
Supplements G. E. C. No. 1137.

1179 Unit Type Magneto Switchboard No. 1800
(Aug. 31-22)
Supplements G. E. C. No. 263.
" " " 385.
(Transmits Bulletin No. 56 Subject same as G. E. C.)

1180 Method of Assigning Lines and Trunks—100 Point Step-by-Step Machine Switching Equipment.
(July 14-22)
(Transmits Notes: Same Subject)

1181 5/8 Inch Forged Eye Nuts.
July 18-22.
Replacing in part G. E. C. No. 953.
(Transmits Issue 2 of Drwg. 46-L-26)

1182 B Guy Shelf.
(July 19-22)
Replacing G. E. C. 1090.
(Transmits Issue 3 of Drwg. 46-M-29)

1183 Tamping Bar.
(July 17-22)
(Transmits Specifications 4156 Tamping Bar, Drwg. 46-L-1)

1184 "R" and "S" Cable Balconies.
(July 19-22)
Supplementing G. E. C. No. 944.
(Transmits Drwgs. 143-A-4 ("R" Balcony) and 143-A-5 ("S" Balcony).

1185 Green Pole Paint.
(July 18-22)
(Transmits Specifications No. 4175 (Replacing Spec. 2642)).

1186 Protection for Exposed Cord Tips at Private Branch Exchanges.
(July 24-22)
Supplementing G. E. C. No. 550.

1187 1-A Transmission Measuring Set, 2-A Oscillator, and Detailed Methods for Making Transmission Tests on Manual Circuits and Equipment.
Replacing in Part G. E. C. No. 634.
(Aug. 1-22)
(Transmits Sections I-A, I-C, II-A of Part I of Transmission Mtce. Practices.
(Transmits also Transmission Mtce. Practices—List of Current Sections dated July 13-22)

[fol. 15407]

1188 Method of Operation of Panel Machine Switching Equipment.
(Transmits Bulletin: Same subject)
(Aug. 15-22)

1189 Standardization of Outside Plant Practices—Specifications 3912 General Cable Splicing. Supplement, D.
(July 28-22)
Supplementing G. E. C. No. 778.
Supplementing Specifications 3912.
(Transmits Supplement D to Handbook Spec. #3912)

1190 Machine Switching—Operators' Dialing Tools.
(July 31-22)

1191 Sale of Testing Apparatus to Power Companies and Other Outside Associated Interests.
(July 25-22)

1192 Trouble Operators' Positions for Switchboards Nos. 1, 1-C and 1-D.
Replacing in Part G. E. C. Nos. 522 and 766.
Supplementing G. E. C.'s 644 and 787.
(Transmits Bulletin No. 62 Subject same as G. E. C.)
(Aug. 15-22)

1193 Toll Operating Room Desks.
(Oct. 16-22)
(Transmits Bulletin No. 66. Same subject. Also Notes on Toll Operating Room Desks).

1194 No. 6-A Distributor Used as a Rotary Telegraph Interrupter.
(Transmits Bulletin No. 51: Same Subject)
(Aug. 17-22)
(Supp. G. E. C. #1387)

1195 Public Address Systems.
(Aug. 17-22)
(Transmits Bulletin No. 61: Same Subject)
(Supplemented by G. E. C. No. 1328)

1196 Sub-station Installation—Inside Wiring Nail.
(Supplementing G. E. C. No. 987)
(Aug. 31-22)

1197 Lanterns.
(Aug. 29-22)
(Transmits Drwg. 46-M-58)

1198 Drive Screws.
(Aug. 30-22)
Replacing in Part G. E. C. 276.
Replacing G. E. C. 698.
(Transmits Specifications No. 4048)

1199 Standardization of Outside Plant Practices—Specification No. 3926—Pole Line Construction.
(Aug. 28-22)
Replacing G. E. C. No. 674.
(Transmits Spec. No. 3926 Same Subject as above)

1200 "Standard Traffic Engineering Practices for Local and Toll Central Office Equipments".
(Nov. 14-22)
Replacing G. E. C.'s No. 644 and 886.
[fol. 15408] (G. E. C. is in Bulletin Form)

1201 Braces for Extension Fixture and Terminal Pole Crossarms.
(Aug. 31-22)
Replacing G. E. C. 769.
Replacing in part G. E. C. 276.
(Transmits Spec. 4182 Same Subject)

1202 Pole Derrick Jacks.
(Sept. 22-22)

1203 Friction Tape.
(Aug. 31-22)
Replacing G. E. C. 804.
Replacing G. E. C. 725.
Replacing Specifications 3886.
(Transmits Spec. 4183 "Friction Tape")

1204 Pole Derricks.
(Sept. 30-22)
(Transmits Handbook Specification 4192—Operation of Pole Derricks Drawing Nos. 141-A-70 to 73 inc. 143-A-27 to 34 inc. and 195-B-31 also 2 cuts.)

1205 Truck Bodies.
(Sept. 11-22)
(Transmits drwgs. and pictures)

1206 Specifications 4123 "NM" Cable.
(Sept. 12-22)
(Supplementing G. E. C. No. 996)
(Transmits Spec. 4123)

1207 Nos. 7, 8 and 9 Fanning Strips.
(Sept. 13-22)

1208 Amendment No. 1 to Specifications No. 4127—"Muslin".
(Sept. 19-22)
Supplementing G. E. C. 1038.
(Transmits Amendment as shown above).

1209 Mechanical Toll Ticket Distributing System.
(Oct. 5-22)
Supplementing G. E. C. 1042.

1210 Standardization of Sub-station Practices—Specifications No. 3859 Substation Wiring Plans.
(Sept. 20-22)
(Transmits Handbook Spec. No. 3859 subject as above, also Forms E-404 to E-415 together with illustrations of sub-sets)

1211 S Tree Wire.
(Sept. 30-22)
(Transmits Spec. 4153 S Tree Wire)

1212 Cable Clamps and Cable Clamp Rings.
(Sept. 27-22)
Replacing G. E. C.'s Nos. 931 and 958.
(Transmits Spec. No. 4191 Subject same as G. E. C.)

1213 C Cable Extension Arm.
(Sept. 30-22)
Replacing in Part G. E. C. No. 960.
(Transmits Drwg. 46-M-5 Issue 3)

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1214 Storage Battery System for Supplying Coin Collect Current.
(Oct. 12-22)
(Transmits Bulletin No. 55 Subject, same as above)

1215 Maximum Potential on Conductors Leased to Western Union Telegraph Company.
(Oct. 6-22)
Supplementing G. E. C.'s 486 and 1077.

1216 Sub-station Materials—Tools and Gauges—Battery Light.
(Oct. 10-22)
(Transmits Bulletin No. 67—Battery Light)

1217 Sub-stations—Desk Stands—New Felt for Base.
(Oct. 9-22)

1218 Telegraph Sounder Stopper No. 12087.
(Oct. 11-22)

1219 Telephone Buildings—Dust Screens for Windows in Machine Switchrooms.
(Oct. 19-22)

1220 Neutralization of Crossfire in Cable Circuits.
(Nov. 15-22)
(Transmits Bulletin No. 64 Arrangements for Neutralizing Crossfire Between Grounded Polar Duplex Telegraph Circuits in Cable)

1221 Stop Accidents Insigne and Year Plates.
(Oct. 29-22)
(Transmits Notes, same subject, in both 8½" x 11" and Handbook Sizes)

1222 Outside Plant Engineering Practices.
(Nov. 1-22)
(Transmits Preliminary Draft of General, Pole Line and Underground Conduit Handbooks and of the Specifications for Pole Line Inspection)

1223 Pulling-Up Clamp.
(Nov. 14-22)
Replacing G. E. C. No. 983.
(Transmits Drwg. 136-A-85 Issue 2 Pulling-Up Clamp)

1224 Standardization of Outside Plant Practices—Supplementary Specifications Relative to the Use of 455-Pair 19-Gauge Cable.
(Nov. 9-1922)
Supplementing G. E. C.'s Nos. 778 and 902.
(Transmits Supp. "B" to Spec. 3929 Aerial Cable Const., and Supp. "F" to Spec. 3912 General Cable Splicing)

1225 Strand Puller.
(Nov. 24-22)
(Transmits Drwg. 141-A-75 "B" Puller and Drwg. 141-A-78 "C" Puller)

1226 Digging Bar.
(Nov. 16-22)
(Transmits Spec. 4204 which replaces, Spec. 3140)
(Transmits Drwg. 46-L-136 which forms part of Spec. 3140)

[fol. 15410]

1227 Wooden Cable Dresser.
(Nov. 23-22)
(Transmits Drwg. 46-L-113)

1228 Blasting Mat.
(Nov. 25-22)
(Transmits Drwg. 46-Z-2, Blasting Mat)

1229 Wiping Cloth and Crotch Cloths.
(Nov. 29-22)
(Transmits Drwg. 46-M-121 "Wiping Cloths")
(Transmits Drwg. 46-L-122 "Crotch Cloths")

1230 Splicers Mirror.
(Dec. 2-22)
(Transmits Drwg. 46-L-142)

1231 Houseline.
(Dec. 1-22)
Replaces G. E. C. 964.
Replaces Specifications No. 4069.
(Transmits Specifications 4184)

1232 Multiple Private Branch Exchange for Operation with Manual and Machine Switching Central Offices—No. 600-C.
(Jan. 23-23)
(Transmits "Bulletin No. 29A" and "Notes giving Method of Operation")

1233 4-B Oscillator.
(Jan. 10-23)
Supplementing G. E. C. No. 941.
(Transmits Bulletin No. 70- 4-B Oscillator)

1234 Calculagraphs—Automatic Ribbon Reverse and Improved Winding Tool.
(Dec. 6-22)
(Transmits Drwg. 38-Y-1463 covering Winding Tool and Key Pipe)

1235 Handbook of Substation Practices—Transmitting Supplement "A" to Specifications No. 3853, Substation Wiring.
(Dec. 19-22)
(Supplementing G. E. C. No. 712)
(Transmits Handbook Spec. as above)

1237 Telephone Repeaters—Nos. 101-D and 102-D Vacuum Tubes.
(Jan. 13-23)
Supplementing G. E. C. No. 714 and G. E. C. No. 883.
(Transmits Bulletin No. 68—Nos. 101-D and 102-D Vacuum Tubes in Telephone Repeaters)

1238 Bower Barff Finished Hand Wheels for Power Switchboards.
(Dec. 26-22)

1239 New "A" and "B" Operators' Telephone Sets.
(Jan. 6-23)
(Transmits Bulletin No. 58—"No. 62 Induction Coil "B" Operators Telephone Set also Bulletin No. 71—"No. 63 Induction Coil "A" Operators' Telephone Set)

1240 Guy Clamp.
(Dec. 28-22)
Replacing in part G. E. C.'s Nos. 276, 516 and 681.
(Transmits Spec. 4180 which includes
[fol. 15411] Drwg. 46-L-60)

1241 Ground Wire.
(Jan. 3rd, '23)
Supplementing G. E. C. No. 622.

1242 3/8 Inch Woven Conduit.
(Jan. 15-23)
Replacing in Part G. E. C. No. 881.

1243 Cardboard Containers for First Aid Materials.
(Jan. 18-23)
Supplementing G. E. C. No. 956.
(Replaced in part and supplemented by G. E. C. No. 1363)

1244 Solder Pot.
(Jan. 15-23)
(Transmits Drwg. 46-M-73)

1245 House Bracket.
(Feb. 6-23)
(Transmits Amendment No. 1 to Spec. No. 3316 also Drwg. 46-L-184 which replaces 88-E-88)

1246 Paraffin Dipper.
(Jan. 16-23)
(Transmits Drwg. 46-M-70)

1247 Handbook of Central Office Telegraph Practice.
(Feb. 28-23)
Supplementing G. E. C. No. 1063.
(Transmits Specifications No. 4064 "Arrangements for Obtaining Simultaneous Telephone and Grounded Circuit Telegraph Operation" also Specifications No. 4065—"Telegraph Circuits at No. 4 Morse Board and Test Board" also Form E-268—Revised Dec. 22, 1922—"List of Specifications Included in Handbook of Central Office Telegraph Practices").

1248 Standardization of Outside Plant Practices—Supplementary Specifications Relative to the Use of New Type Guy Clamp.
(Jan. 22-23)
Supplementing G. E. C.'s Nos. 822, 902, 903 and 1010.
(Transmits Supp. "A" Spec. 3927 "Guying", Supp. "C" Spec. 3929 "Aerial Cable Construction", Supp. "B" Spec. 3931 "Block Cable Construction", Supp. "B" Spec. 3933 "House Cable Placing")

1249 Wooden Insulator Pins.
(Jan. 22-23)
Replacing in part G. E. C. No. 613.
Replacing G. E. C. No. 809.
(Transmits Spec. No. 4213 with Drwgs. Nos. 46-L-90 and 46-L-91)

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1250 Creosoted Yellow Pine Poles.
(Jan. 23-23)
Replacing G. E. C. No. 721
(Transmits, Specifications No. 4209 (Subject same as G. E. C.))

1251 Sub-stations Protection No. 60-A Fuse.
(Jan. 24-23)
Supplementing G. E. C. No. 1173
(Transmits Bulletin No. 73 "Sneak Current Fuse For Private Branch Exchanges and Telegraph Substations.")

1252 Power Plant and Main Distributing Frame Grounding System.
(Jan. 20-23)
(Transmits Bulletin No. 63. "Power Plant and Main Distributing Frame Grounding System)

1253 Iron Cable Dresser.
(Jan. 29-23)
(Transmits Drwg. 46-L-107, Same Subject)

1254 Inadequate Separations on Jointly Used Poles and at Crossings of Telephone Wires over Foreign Wires.
(Jan. 30-43)
(Supplementing G. E. C. No. 975

1255 Telegraph Substation Installation—Supplement "A".
(Jan. 29-23)
(Supplements G. E. C. No. 823
(Transmits Supp. "A" to Spec. 3852 Subject as above)

1256 Simplex Pole Jack.
(Feb. 17-23)
(Transmits Bulletin No. 14—The Simplex Pole Jack)

1257 No. 30 Protector Block.
(Jan. 30-23)
Supplementing G. E. C. No. 1126

1258 Long Cords for Use at Substations.
(Feb. 3-23)
Supplementing G. E. C. No. 1125

1259 Public Telephone Stations—Booth Lamp Receptacle.
(Transmits Drwg. 705-681)

1260 Quickly Detachable Dial Mounting for Central Office Switchboards, Attended Pay Stations and P. B. X. Switchboards.
(Apr. 16-23)
Supplementing G. E. C. 1175
(Transmits Photographs and Maintenance Information)

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1261 Transposition Practices, Exclusive of Construction.
(Mar. 15-23)
Replacing G. E. C. No. 825
Replacing in part G. E. C. No. 738
Supplementing and in part replacing G. E. C.'s Nos. 563 and 652
Supplementing G. E. C. No. 871
(Transmits Number of sections—Subject Transposition Practices)

1262 Maintenance of Printing Telegraph Apparatus —Spring Balances.
(Feb. 26-23)
Supplementing G. E. C. No. 1170

1263 Use of Shellac on Cable Forms.
(May 11-23)
Replacing G. E. C. No. 667

1264 Substations—Repair of No. 2 Type Dials.
(Mar. 1-23)
Supplementing G. E. C. 296 and G. E. C. 554.

1265 Standardization of Outside Plant Practices. Specifications 4190 Railroad Crossings.
(Mar. 19-23)
Replacing G. E. C. No. 401 and G. E. C. No. 530
(Transmits Specification No. 4190 Handbook Form)

1266 Distinctive Markings for Staggered Twist Construction in Small Gauge Non-Quadded Cables and for Experimental Cables.
(Mar. 5-23)
Supplementing G. E. C. 1174

1267 135-Cycle Signaling Motor—Generator Sets.
(Mar. 16-23)
(Transmits Bulletin No. 69 Subject as above)

1268 Modification of No. 2 Private Branch Exchange System for Machine Switching Operation.
(Mar. 27-23)
(Transmits drawing 143-A-41 Private Branch Exch. No. 2 and Dwg. 708-5 Modifications in No. 2 P. B. X. Subscribers Sets)

1269 Cable Bending Spring.
(Mar. 26-23)
(Transmits Dwg. 46-X-14. Subject same as G. E. C.)

1270 No. 217 Plug for Use in Repeater Gain and Balance Tests and Line Impedance Tests.
(Mar. 27-23)
Supplementing G. E. C.'s No. 714, 891, 941, and 1029
(Transmits Dwg. 38-Y-1468 No. 217 Resistance Plug)

1271 Bolts for Cable Suspension Clamps.
(April 5-23)
Replacing G. E. C. No. 179
Replacing in part G. E. C. 276
(Transmits Specifications 4197—Dwg. 46-L-137)

1272 Substations—Materials—Tools and Gauges—No. 311 Tool.
(Mar. 26-23)
(Transmits Dwg. 38-Y-1619 No. 311 Tool)

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1273 Crossarm Bolts.
(Mar. 28-23)
Replacing in Part G. E. C. #276
Replacing in Part G. E. C. No. 698
(Transmits Specifications 4174)

1274 Cant Hook—Specifications No. 4205.
(Apr. 17-23)
(Transmits Specifications 4205—Dwg. 46-L-82)

1275 Strand Connectors.
(Apr. 3-23)
Supplementing G. E. C. 760
(Transmits Amendment No. 1 to Specifications 3925)

1276 Tool for Removing Signal Plugs No. 274 Tool.
(Apr. 10-23)
(Transmits Dwg. 38-Y-1641)

1277 Toll Transmission Practices—Section IX-A Vacuum Tubes Used in the Bell System—Bulletin No. 77.
(Oct. 19-23)
(Transmits Bulletin No. 77—Toll Transmission Practices)

1278 Telephone Repeater Data—Section II-E Arrangement for Connecting Cord Circuit Repeaters to Circuits Terminated with Three-Winding Transformers—Bulletin No. 74.
(Supplementing G. E. C. No. 826)
(June 23-23)
(Transmits Bulletin No. 74—Improved Method for Connecting Cord Circuit Repeater to Four-Wire Circuit)

1279 Transmission Maintenance Practices—Section VIII-E—Routine for Toll Circuit Layout. Records.
(July 3, 1923)
(Transmits Bulletin—Same subject as G. E. C.)

1280 Manhole Platform Support.
(Apr. 12-23)
(Transmits Dwg. 46-M-71 Subject as above)

1281 Type "T" Medium Speed Vertical Engines for Driving Commercial Type Emergency Generating Equipment in Machine Switching Offices
(May 25-23)
(Transmits Bulletin No. 83—Type "T" Vertical Engines for Telephone Reserve Power Service)

1282 Power Plants for Panel Machine Switching Offices.
(May 1-23)
(Transmits Bulletin No. 85 "(Replacing Bulletin No. 41)"
(Power Plants for Machine Switching Offices of the Panel Type)
(Supp. by G. E. C. #1336)

1283 Standard Combination Reel.
(May 1-23)
(Transmits Amendment No. 1 to Spec. 2251)

1284 Specifications 4124—"ANA" Cable.
(Apr. 28-23)
Supplementing G. E. C. No. 1174
Replacing G. E. C. 852
Replacing G. E. C. 635
Replacing Spec. 3800
(Transmits Specifications 4124—"ANA" Cable)

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1285 Specifications No. 4125—"ANB" Cable.
(May 3-23)
Replacing G. E. C. No. 388
Replacing Spec. 3357
(Transmits Specifications 4125 "ANB" Cable)

1286 Trolley Guards and "D" Tree Guards.
(May 3-23)
(Replacing in part G. E. C. #911)
(Transmits Dwg. 46-M-12 Issue 3 Douglas Fir Trolley Guard
(Transmits Dwg. 46-M-13 Issue 3 Southern Yellow Pine Trolley Guard
(Transmits Dwg. 46-M-76 Douglas Fir "D" Tree Guard
(Transmits Dwg. 46-M-78 Southern Yellow Pine "D" Tree Guard)

1287 Waxed Linen Thread.
(Apr. 26-23)

1288 Rubber Bandages and Bag for Rubber Bandages.
(May 7-23)
(Transmits Dwg. 46-x-10 Rubber Bandage.
(Transmits Dwg. 46-x-6 Bag for Rubber Bandage

1289 Splicers' Tents.
(May 5-23)
Replacing G. E. C. No. 969
Replacing Drawing No. 138-A-12
(Transmits Drawing 141-A-90)

1290 Pike Poles.
(May 11-23)
(Transmits Spec. No. 4235 Pike Poles, and Dwg. 46-M-35)

1291 Manila Rope.
(May 4-23)
(Supplementing G. E. C. No. 466)
(Transmits Specs. No. 4218—Replacing Specs. 3682)

1292 Substations—Signs—Sign Cement Kit.
(May 11-23)
(Supplementing G. E. C. No. 862)
(Transmits Dwg. 46-L-175 which replaces Dwg. 94-E-34)

1293 Toll Switchboard No. 1—Flush Type Glass Keyshelf Bulletin Holder.
(May 12-23)
(Transmits Dwg. 704-1661 Same subject as G. E. C.)

1294 Improvements in Existing Types of Composite Ringer Equipment.
(May 25-23)
Replacing G. E. C.'s 428 and 850
Partly Replacing G. E. C. 898
Replacing Specs. 3252
(Transmits Bulletin No. 87 (Subject same as G. E. C.) which replaces Bulletin No. 31)
(Supp. by G. E. C. 1384)

1295 Round Washers.
(May 16-23)
(Supplementing G. E. C. No. 1112)
(Transmits Issue 2 of Dwg. 46-L-87)

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1296 Half Round Wooden Molding.
(May 22-23)
(Replacing G. E. C. 1121)
(Transmits Dwg. 46-L-200 Subject same as G. E. C.)

1297 Creosoted Plank for Two Block Anchors.
(May 15-23)
(Transmits Amendment No. 1 to Specifications No. 3138 and Dwg. 46-L-222)

1298 Substations—Tools and Gauges—Transmitter Carrying Bag.
(May 14-23)
(Transmits Dwg. 38-Y-1606—Transmitter Carrying Bag)

1299 Type "A" Porcelain Knob.
(May 24-23)
(Transmits Issue 4 of Dwg. 89-E-5 Type "A" Porcelain Knob)

1300 Substations—No. 152-A Backboard for Loud Ringing Bells.
(May 22-23)
(Transmits Dwg. 705-509. Subject same as G. E. C.)

1301 Rubber Gloves.
(May 28-23)
(Transmits Specifications No. 4238—Provisional Specifications for Rubber Gloves).

1302 Machine Switching Private Branch Exchange No. 700-C for Use in Manual or Machine Switching Central Office Districts.
(Sept. 25-23)

1303 Cable Car and Sliding Hook.
(June 9-23)
Transmits Specifications #4217—Cable Car Dwg. 143-A-7 and Drawing 46-M-75 Sliding Hook

1304 Insect Injury to Cable Sheath.
June 13-23
(Transmits Bulletin No. 78—Same Subject)

1305 Standardization of Outside Plant Practices—Specifications No. 4236 "Terminal Marking".
(May 23-23)
(Transmits Handbook—Specs. 4236 "Terminal Marking")

1306 Specifications for Creosoting Douglas Fir Timber and Specifications for Creosoted Douglas Fir Conduit.
(June 12-23)
(Replacing Specifications No. 3115)
(Transmits Spec. No. 4242—Replacing Spec. 3115—Specs. for Creosoting Douglas Fir Timber. Transmits Spec. No. 4243—Specs. for Creosoted Douglas Fir Conduit)

1307 Termination of Railroad Dispatch and Message Circuits in P. B. X. Switchboards.
(May 29-23)

1308 Splicer's Fiber Test Board.
(May 26-23)
(Transmits Dwg. 46-L-177, Subject same as G. E. C.)

1309 Standardization of Outside Plant Practices—Specifications No. 4246 "Maintenance of No. 14 Cable Terminals".
(June 13-23)
(Transmits Specs. as above)

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1310 Goggles.
(June 26-23)
(Transmits Bulletin No. 76—Goggles)

1311 Substations - Standardization of Practice—Transmitting Supplement "A". To specifications No. 3857—No. 50 Coin Collector Installation.
(June 29-23)
Supplementing G. E. C. No. 712
(Transmits Supp. "A" to Specs. 3857—Handbook form)

1312 Machine Switching Substations—Transmitting Supplement "A" to Specifications No. 4160.
(June 16-23)
Supplementing G. E. C.'s No. 988 & 1101.
Transmits Supp. "A" to Spec. No. 4160 Machine Switching Substations. Handbook form.

1313 Substation—Coin Collectors—Carrying Case for Coin Relays and container for Coin Shutes.
(June 14-23)
Supplementing G. E. C. No. 1149
(Transmits Dwg. 38-Y-1467 — Carrying Case for Coin Relay)

1314 Renumbering Strips.
(June 18-23)
(Transmits Dwg. 46-M-143)

1315 Corner Bridle Rings.
(June 15-23)
(Replacing G. E. C. No. 161)
(Transmits Spec. No. 4244 "Dwg. 46-L-183" Same subject, which replaces Spec. No. 3328)

1316 Porcelain Strain Insulators.
(June 22-23)
Supplementing G. E. C. No. 962
Replacing G. E. C. No. 1158
(Transmits Amendment No. 2 to Spec. No. 4041 also Dwg. 46-L-134)

1317 Pot Hook.
(June 1923)
(Transmits Dwg. 46-L-185)

1318 1 Inch Cotton Tape.
(June 20-23)

1319 Shave Hook.
(June 27-23)
(Transmits Dwg. 46-L-128 Issue 2—Shave Hook)

1320 Loading Data—Section II-A Stub Cables for Loading Coil Cases Bulletin No. 88.
(Dec. 8-23)
(Transmits Bulletin No. 88—Subject same as G. E. C.)

1321 Loading Data—Section II-C—Loading Coils and Cases for Use in Loading Toll Engrance and Intermediate Cables—Bulletin No. 107.
(Dec. 8-23)
(Transmits Bulletin No. 107—Subject: Same as G. E. C.)

1322 Loading Data Section II-G—Loading Coil Cases for Office Installations—Bulletin No. 90.
(Dec. 8-23)
(Transmits Bulletin No. 90 — Subject: Same as G. E. C.)

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1323 Fanning Strips for Cable Terminals.
(June 30-23)

1324 Securing Data on Busy Subscribers' Lines—Machine Switching Equipment.
(July 6-23)
(Transmits Dwg. 706-371 "Method of Securing Overflow Data on Busy Line")

1325 Bonita Cable Rings.
(July 9-23)
(Transmits Specifications No. 4199 Bonita Cable Rings—Specs. contain Dwgs. 46-L-15, 46-L-138, 46-L-148 and 46-M-118)

1326 Terminal Tag.
(July 7-23)
(Transmits Drawing 46-L-105)

1327 Body Belts and Safety Straps.
(July 6-23)
Supplementing G. E. C. 993
(Transmits Amendment No. 1 to Specs. 4070 Body Belts and Safety Straps)

1328 Public Address Systems. Section III-A Roll Call Transmitter — Amplifier Set. Bulletin No. 75.
(July 16-23)
Supplementing G. E. C. No. 1195
(Transmits Bulletin No. 75 Roll Call Transmitter-Amplifier Set)

1329 Rubber Tape.
(July 10-23)
Replacing G. E. C. #881

1330 Substations—Use of Transmitters and Receivers with Non-Standard Apparatus.
(July 9-23)
(Transmits Photograph)

1331 "B" Tree Guard.
(July 11-23)
Replacing G. E. C. No. 790
(Transmits Dwg. 46-L-143 "B" Tree Guard)

1332 Clipping Knife.
(July 17-23)
(Transmits Dwg. 46-L-117 Clipping Knife)

1333 Fanning Strips for Protected Building Terminals.
(July 20-23)
Replacing in Part G. E. C. 968
(Transmits Dwg. 46-X-62, No. 10 and No. 11 Fanning Strips)

1334 Substations—Coin Collectors—No. 50 Type for Post-payment Service.
(Oct. 24-23)
(Transmits Dwg. 200-B-44)

1335 Toll Switchboard No. 1—Messenger Call Signal System.
(Aug. 13-23)
(Transmits Dwg. 196-B-37, 201-B-22 and 201-B-23)

1336 Combined Use of 65 and 33 volt Charging Generators in Panel Machine Switching Offices
(Aug. 15-23)
(Supplementing and Replacing in part G. E. C. No. 1282)
(Transmits Bulletin No. 100. Subject—Use of 65 Volt Generators in Machine Installing Offices)
[fol. 15419]

1337 Substations—Test Sets—Battery for 17-D and 17-E Lineman's Sets (Transmits Dwg. 200-B-61, No. 17-D and 17-E Test Sets)
(July 31-23).

1338 Maintenance of Main Frame Heat Coils and Protector Springs—No. 22-B Test Set.
(Aug. 1st-23)
Supplementing G. E. C. No. 580.
(Transmits, "Notes on the Operation of the No. 22-B Test Set)

1339 Phantom Repeating Coils.
(Nov. 15-23)
Replacing G. E. C. 1168
(Transmits Bulletin No. 91—"Characteristics of Nos. 75 & 76 types of Phantom Repeating Coils", and Notes entitled Uses of Equality and Inequality Ratio Phantom Repeating Coils.

1340 Printing Telegraph Service—Booklet for Patrons.
(Aug. 15-23)
Supplementing G. E. C. 1087
(Transmits Booklet "C" Printing Telegraph Service)

1341 Specifications No. 4039—"Cable Terminating".
(Aug. 29-23)
(Transmitting Handbook Specs. No. 4039 same subject as G. E. C.)

1342 Transmission Maintenance Practices—New Numbering System and Printing of Sections by the Western Electric Company.
(Aug. 28-23)
(Transmits List of Current Sections)

1343 Covers for No. 14 Cable Terminals.
(Aug. 14-23)

1344 Sag Gauge.
(Sept. 5-23)
(Transmits Dwg. 46-M-150 Sga. Gauge)

1345 Linemen's Hand and Test Sets—Standard Cords and Change in Finish.
(Aug. 25-23)

1346 Specifications 4130 "A. S. A." Cable.
(Aug. 31-23)
Supplementing G. E. C. 1174, Replacing G. E. C. 494. Replacing Specifications 3729
(Transmits Specifications 4130 A. S. A. Cable)

1347 Standardization of Lengths of Stub on No. 14 Cable Terminals.
(Aug. 30-23)

1348 Storage Battery System for Supplying Message Register Current in Manual Offices.
(Sept. 10-23)
Partly Replacing G. E. C. No. 745
Replacing Specs. No. 3761.
(Transmits Bulletin No. 99—Subject same as G. E. C.)

1349 Terminal Marking Outfit.
[fol. 15420] (Sept. 5-23)

1350 Terminal Clamp.
(Sept. 11-23)
(Transmits Dwg. 46-x-77 — Terminal Clamp)

1351 Eye Bolt Method for Dead Ending Strand and Attaching Guys.
(Sept. 4-23)
(Transmits—Handbook Specs.—"Strand Dead End and Guy Attachments"—Eye Bolt Method—Instructions for Field Trial Only)

1352 Provisional Specifications No. 4279 "Lead Sleeving".
(Sept. 7-23)
Replacing G. E. C. 543
Replacing Provisional Specifications No. 3626
(Transmits Prov. Spec. No. 4279 Lead Sleeving)

1353 Devices for Securing Cable Clamps to Masonry.
(Oct. 11-23)
(Transmits Bulletin No. 95, Subject Same as G. E. C.)

1354 Machine Switching–Handling Directory Errors.
(Sept. 28-23)
(Transmits Appendices I and II)

1355 Local Switchboard No. 1 "A" Cord and Inter-Office Trunk.
(Supervisory Relays—Tests and Adjustments)
(Oct. 2-23)
Replacing in part G. E. C.'s Nos. 496 and 1036
(Transmits "notes" subject same as G. E. C.)

1356 Loading Data—Section I-A Designation of Loading Systems. Bulletin No. 106.
(Dec. 8-23)
(Transmits Bulletin No. 106. Subject: Same as G. E. C.)

1357 Telephone Repeater Data—Section VI-E—"22" Type Panel Mounted Telephone Repeaters (Reading Type) Bulletin No. 84.
(Oct. 29-23)
Supplementing G. E. C. #714
(Transmits Bulletin No. 84—"22" Type Panel Mounted Telephone Repeaters (Reading Type)

1358 Telephone Repeater Data — Section VII-B—Foreign Wire System Employing "Reading Type" Repeaters and Associated Apparatus —Bulletin No. 97.
(Nov. 7-23)
(Transmits Bulletin #97. Subject same as G. E. C.)

1359 Changes in Charging Motor Generator Sets and Control Apparatus.
(Oct. 3-23)
Supplements and replaces in part G. E. C. #511
(Transmits Bulletin No. 101. Subject same as G. E. C.)

1360 Transmission Maintenance Practices—Section II-G—Subject "Description of 6-B Oscillator"—Bulletin No. 110.
(Transmits Bulletin No. 110. Subject same as G. E. C.)

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1361 Power Plants for Step-by-Step Machine Switching Offices.
(Oct. 5-23)
(Transmits Bulletin No. 104. Subject same as G. E. C.)

1362 Carrier Current Systems Data—Sections VI-A and VI-B Floor Type Repeater. Bulletin No. 82.
(Dec. 31-23)
Supplementing G. E. C. No. 1031
(Transmits Bulletin No. 82 Sections as above) (Order on W. E. Co.)

1363 First Aid Supplies.
(Oct. 1-23)
Replacing G. E. C.'s Nos. 956 and 1015
Replacing in part G. E. C. No. 1243
Supplementing G. E. C.'s Nos. 920 and 1243
(Transmits Specs. covering changes, See G. E. C. for list)

1364 Telephone Repeater Data—Section VIII-A—Automatic Filament Current Regulating Circuit—Bulletin No. 114.
(Dec. 13-23)
(Transmits Bulletin No. 114. Subject: Automatic Filament Current Regulating Circuit)

1365 Apparatus Blanks for Covering Banks of Unused Subscribers Multiple Jacks.
(Sept. 19-23)
(Transmits Dwg. 38-Y-1413—Apparatus Blanks for Covering Unused Multiple Jacks)

1366 Transmission Practices—Section VI-B—Methods for Making Transmission Tests on Step-by-Step Machine Switching Circuits and Equipment.
(Sept. 27-23)
(Transmits as above)

1367 Square Washers.
(Oct. 10-23)
(Supplements G. E. C. 1112
(Transmits Dwg. 46-L-88—Issue 2)

1368 Bulletin Holder for Use on Switchboard Sections.
(Oct. 15-23)
(Transmits Dwg. 192-B-34)

1369 Carrier Current Systems Data—Sections V-C and D—"Carrier Telegraph System Terminal—Type "B"—Bulletin No. 94
(Oct. 26-23)
Replaces in Part G. E. C. No. 1031
(Transmits Bulletin No. 94—Carrier Telegraph System)

1370 Stove Bolts.
(Oct. 10-23)
(Transmits Dwg. 46-L-41 Stove Bolts)

1371 Maintenance Tools for No. 14 Cable Terminals.
(Oct. 19-23)
(Transmits Dwgs. 46-M-65 Terminal Drip Pan
46-X-72 Spray Cleaner
46-X-73 Water Tool
46-X-15 Compressed Air Sprayer)

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1372 Substations—Test Sets No. 17 Linemen's Type.
(Oct. 18-23)
(Transmits Dwg. 146-A-58—Carrying Case for No. 17 Test Set)

1373 Crosstalk Practices Section V-A—50-A Crosstalk Set—Bulletin No. 80.
(Nov. 1-23)
Replacing G. E. C. 181
(Transmits Bulletin—subject same as G. E. C.)

1374 No. 29-B Binding Post.
(Oct. 13-23)
(Transmits Dwg. 46-X-78)

1375 Telephone Repeater Data—Section II-B Singing Point Data.
(Oct. 31-23)
(Supplementing G. E. C. 826)
(Supplementing G. E. C. 891)
(Transmits Data as per above)

1376 Central Office Telegraph Practices—Section III-D, Two-Way Non-Duplex Polar Telegraph System, Bulletin No. 113.
(Nov. 2-23)
(Transmits Bulletin No. 113—Section III-D "Two-Way Non-Duplex Polar Telegraph System)

1377 Clearing Substation Grounds on No. 26 and No. 27 Protector Blocks by Means of 200-Volt Breakdown Test.
(Oct. 23-23)
Supplements G. E. C. No. 560

1378 Line Thermometer.
(Nov. 5-23)
(Transmits Dwg. 46-X-74—Line Thermometer)

1379 Chestnut Poles.
(Oct. 23-23)
Supplementing G. E. C. No. 1136
Transmits Amendment No. 1 to Specs. No. 4166—Chestnut Poles

1380 Guy Rule.
(Nov. 9-23)
Replaces G. E. C. No. 1030
(Transmits Dwg. 145-A-39, Guy Rule and Sample Rule)

1381 Substations—Tools and Gauges—Shellac Set for Installer and Repairmen.
(Nov. 13-23)
(Transmits Dwg. No. 201-B-90—Shellac Set)

1382 Copper Sleeves and Tinned Steel Sleeves.
(Nov. 7-23)
Supplementing G. E. C.'s 1027, 1035 and 1132
(Transmits Amend. No. 1 to Specs. 4139 "Copper Sleeves"
Dwg. 46-L-35 Issue 3. "Gauges for Copper Sleeves" and Amend. No. 2 to Specs. 4137 "Tinned Steel Sleeves")

1383 Morse Line Terminal Designation Strip—No. 91-A.
(Nov. 1-23)

1384 Toll Signaling Equipment—Adjustable Back-Stop for No. 150 Type Relays.
(Nov. 15-23)
Supplementing G. E. C. No. 1294
(Transmits Bulletin 111. Subject Same as G. E. C.)

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1385 Transmission Maintenance Practices—Section II-H "8-A Oscillator" Bulletin No. 115.
(Dec. 14-23)
(Transmits Bulletin No. 115-8-A Oscillator)
(Order on W. E. Co.)

1386 Method of Operation of Step-by-Step Machine Switching Equipment. Corrected and Additional Pages for G. E. C. No. 1076.
(Nov. 28-23)
Replaces in Part and Supplements G. E. C. No. 1076
(Transmits Corrected and Additional Pages for G. E. C. No. 1076)

1387 Printing Telegraph Service—Improved Distributor Brush.
(Nov. 12-23)
Supplementing G. E. C.'s Nos. 1170 and 1194.

1388 Central Office Telegraph Practices—Section I-E Telegraph Subscribers Calling-In Signal.
(Dec. 3-23)
Replacing in Part G. E. C. No. 898
(Transmits Section I-E of Central Office Telegraph Practices)

1389 Corner Brackets.
(Dec. 5-23)
Replacing in Part G. E. C. 790
(Transmits Dwg. 46-L-232 "Corner Brackets"

1390 Transmission Maintenance Practices Sections I-B—1-B Transmission Measuring Set—Bulletin No. 116.
(Dec. 21-23)
Supplements G. E. C. No. 1034. (Order on W. E. Co.)
(Transmits Bulletin No. 116—Subject 1-B Trans. Measuring Set)

1391 British Creosote.
(Nov. 27-23)
(Transmits Specs. No. 4263—British Creosote)

1392 Screw Coupling Duct Rods.
(Jan. 5-24)
(Transmits Dwg. 46-M-144—Subject same as G. E. C.)

1393 Metal Stock Box.
(Dec. 11-23)
(Transmits Dwg. 46-X-65—Metal Stock Box)

1395 Machine Switching Offices—Temporary Positions for Operators and for Sender Monitors.
(Jan. 3-24)
Replacing G. E. C. No. 1023 and G. E. C. No. 1058

1396 Enamel Insulated Cable and Wire.
(Dec. 11-23)
Supplementing and Replacing in Part G. E. C. No. 460

1397 Substations—Improved Mouthpiece for Transmitters.
(Dec. 15-23)
(Transmits Photo Showing Mouthpiece)

1398 Substations—Public Telephone Signs.
(Dec. 26-23)
(Transmits Specifications No. 4290—Public Telephone Signs.) (Enameled Type)

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1399 New Type of Power Protection Panel, Choke Coil and Lightning Arrester.
(Jan. 10-24)
Partly replacing G. E. C. No. 817
(Transmits Dwg. 203-B-51 and 146-A-100)

1400 One Inch Insulated Screw Eyes.
(Jan. 9-24)
Replacing G. E. C. No. 843
(Transmits Dwg. 46-L-193. 1" Insulated Screw Eyes)

1401 Rubber Glove Containers.
(Jan. 7-24)
Supplementing G. E. C. #1301
(Transmits Dwg. 46-X-61 "Rubber Glove Envelope" and 46-M-141 "Rubber Glove Bag")

1402 Bridle Rings.
(Jan. 11-24)
Supplementing G. E. C. No. 1041
(Transmits Amend. No. 1 to Spec. 4110)

1403 Telephone Repeater Data—Section IV-B Toll Service Observing Nos. 11-A-1 and 11-A-2 Repeaters—Bulletin No. 109
(Jan. 15-24)
Supplementing G. E. C. No. 812
Transmits Bulletin No. 109. Subject same as G. E. C.

1404 Douglas Fir Guard Arms and Creosoted Yellow Pine Guard Arms.
Replacing in Part G. E. C. No. 774.
(Jan. 11-24)
(Transmits Amend. No. 1 to Specs. 3936 Douglas Fir Guard Arms)
(Transmits Amend. No. 1 to Specs. 3937 Creosoted Yellow Pine Guard Arms)

1405 Outside Plant Testing Apparatus: No. 19-C Test Set (Exploring Coil) and No. 20-C Test Set.
(Jan. 10-24)
Replacing G. E. C. No. 608
Replacing G. E. C. No. 1071
(Transmits Dwg. 46-M-89—No. 19-C Test Set)

1406 Handling of Explosives.
(Jan. 10-24)
Replacing G. E. C. Nos. 776,932 and 1146
Supplementing G. E. C. No. 1021

1407 Cable Tags.
(Jan. 10-24)
(Transmits Dwg. 46-L-249—Cable Tags)

1408 R and S Cable Balconies.
(Jan. 25-24)
Replaces G. E. C. 1184
(Transmits Issue 3 to Dwg. 143-A-4 "R" Balcony and 143-A-5 "S" Balcony)

1409 Western Cedar Poles.
(Jan. 21-24)
Replacing G. E. C. No. 187
(Transmits Specifications 4283. Western Cedar Poles)

1410 Creosoted Yellow Pine Poles—Amendment to Specifications.
(Feb. 1-24)
(Supplementing G. E. C. 1250)
(Transmits Amend. No. 1 to Specs. No. 4209 and Dwg. 46-M-30. Iss. 3)

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1411 "Steel Tie Wires".
(Jan. 28-24)
(Transmits Specifications No. 4252—Steel Tie Wires)

1414 Paraffin Trough.
(Jan. 24-24)
(Transmits Dwg. 46-L-268 Paraffin Trough)

1415 Gauge for Cable Clamps and Cable Clamp Rings.
(Jan. 25-24)
Supplementing G. E. C. 1212
(Transmits Dwg. 46-L-94 Issue 5—Gauge for Cable Clamps and Cable Clamp Ring)

1416 Paints for Terminal Markings.
(Jan. 26-24)

1417 Telephone Repeaters—Modification of Potentiometer in Unit Rack Floor Mounted Cord Circuit Repeaters
Supplementing G. E. C. No. 714

1421 Technical Features of Wire Telephony as an Adjunct to Radio Broadcasting and Public Address Systems.
(Jan. 31-24)
Supplements G. E. C. No. 1195
(Transmits Bulletin No. 121—Subject Same as G. E. C.)
(Suppl. by G. E. C. 1424)

1424 3-A Speech Input Equipment.
(Feb. 7-24)
Supplements G. E. C. No. 1421
(Transmits Bulletin No. 120 Subject Same as G. E. C.)

[fol. 15426] B—List of Specifications, Including 94 that are in Handbook Form.—Side Folios 15426 to 15455

*Specifications that are printed in handbook form are indicated by an asterisk.

**Obsolescent specifications are indicated by a double asterisk.

198	Butting Board (For guiding a pole into a hole).
359-C	Pole Dinkey (For carrying poles).
**636	Protection of Power circuit entering building.
**703	Steel Framework for Central Office Equipment.
**1143	Inspector's Test Table #5.
**1143-A	Wire Chief's Desk #5—Method of Operating.
1346	Local Chief Operator's Desk #3.
1522	Toll Chief Operator's Desk #2.
**1572	Woodwork and Leather for Central Office Equipment.
**1574	Slate used in Central Office Equipment.
1581	Gas Engine for Use in Telephone Exchanges.
**1598	Five Pair Armored Submarine Cable.
**1600	Ten Pair Armored Submarine Cable.
1605	Eleven Pair Lead Covered Submarine Emergency Cable.
1606	Twelve Pair Emergency Line Cable.
1608	Standard Reel Rack.
1609	Seven Pair Emergency Line Cable.
**1625	Toll Test Board No. 2.

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**1626	Toll Test Board No. 1.
**1627	Wire Chief's Desk #6.
**1627-A	Method of Operating Wire Chief's Desk #6.
**1628	Chief Operator's Desk #5.
**1634	Pole Changes.
**1645	Central Office Equipment with Relay Switchboard #8.
1672	Lead Covered Cable with Wool Insulation for Inside Construction.
1678	Manager's Desk #7.
**1688	Standard Fuller Battery Solution.
1707	Information Desk #5.
1713	Dead Man.
1719	Nails (Galvanized and Tinned).
1721	Special Rock Guy Bolt.

1738 Fifteen Conductor Emergency Cable Reel.
1739 Hard-Drawn Copper Wire.
1741 Portable Service Testing Set #1.
1766 One Pair Emergency Cable Reel.
1775 One Pair Emergency Cable.
1789 Description of Central Office Equipment with Relay Switchboard #9.
1798 Manhole Guard.
1807 Installing a Gas Engine for Use in Telephone Exchanges.
1812 Cable Box Seat.
(Supplemented by G. E. C. 701)
1818 Stringing Hard Drawn Copper Wire.
1841 Wire Chief's Desk #7.
**1846 Red Cedar Poles.
**1849 Copper Sulphate.
1862 Chief Operator's Desk #6.
[fol. 15428]
1914 Manager's Desk #6.
1915 Chief Operator's Desk #7.
1916 Chief Operator's Desk #8.
1926 Light Galvanized Steel Seven Wire Strand (Mild Steel).
**1933 Wiring of a Central Office Equipment.
**1937 Central Office Equipment with Relay Switchboard #9 for Small Office with single position.
1948 Chestnut Poles.
1967 Fire and Sand Pails.
1991 Hole Cleaner.
2009 Preliminary specifications for the Installation of Office Terminals of Wool Insulated Cable.
**2013 Waterproof Coverings for Central Station Equipment.
2036 Inspection of a Dirt Auger.
2052 Inspection of a Joint Twister for Double Tube Sleeves.
2055 Crossarm Cleats.
2061 Asbestos Blanket with Containing Case.
**2075 Galvanized Steel Suspension Wire.
2078 Cleats and Binding Posts for Cable Boxes.
(Supplemented by G. E. C. 767)

2079 Instructions Governing the Use of Dynamite.
(Supplemented by G. E. C. 489)
(See also Specs. 3734)

••2092 Inspection of #4 Protectors and Associated Apparatus.

2133 Inspection of a Box for Holding Protector Parts and Tools in Cable Boxes.

2162 Ten Pair Bridle Wire Cable.

2163 Five Pair Bridle Wire Cable.

••2166 Wire Chief's Desk #8.

••2166-A Description of the Method of Operation for Wire Chief's Desk #8.

••2167-A Description of the Method of Operation for Wire Chief's Desk #9.

••2167 Wire Chief's Desk #9.

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••2168 Toll Test Board #3.

••2168-A Method of Operation for Toll Test Board #3.

2221 Inspection of Chestnut Poles.

2244 Hand Magazine for Dynamite.

••2246 Lockers.

2251 Standard Combination Reel.

2314 Instructions for Connecting Special Steel and Copper Wire at Long Spans.

2316 Six Pair Bridle Wire Cable.

2327 Chief Operator's Desk #9.

2391 Solder Copper Holder (For Holding Hot Soldering Copper).

2426 Tie Wires.

2430 An Extension Fixture.

2435 Structural Steel.

2437 Balcony for Cable Poles for Use with Narrow Cable Boxes.
(Supplemented by G. E. C. 701)

2448 Lead Covered Paper Insulated Bridle Cable.

2462 Balcony for Cable Poles.
(Supplemented by G. E. C. 701)

2472 Wall Tent Stones.

••2487 Provisional Specs. for the Construction of Rural Lines.

2597 Creosoted Gum Plank.

2642 Standard Green Pole Paint.

2688 Description of a Central Office Equipment with Relay Switchboard No. 10.
2746 Chief Operator's Desk #10.
2747 Wire Chief's Desk #10.
2747-A Method of Operation Wire Chiefs' Desks #10 and #11.
*2770 Instructions for the Maintenance Inspection of Crossarms and Guying.
2807 Five (5) Wire Crossarm Cleat #2.
[fol. 15430]
*2842 Long Distance Toll Line Terminal Construction.
(Supplemented by G. E. C. 767)
2868 Serving Board (For serving spun yarn around armor wires in Sub Cable)
*2877 Construction of 40 to 80 Wire Pole Lines.
(Supplemented by Specs. 3636)
(Replaced in Part by G. E. C. 563)
2880 6,000 Pound Strand.
2881 10,000 Pound Strand.
2882 16,000 Pound Strand.
2901 Toll Supervisors' Set #4.
2902 Toll Supervisors' Set #5.
2906 Creosoted Blocks for Three Block Anchors.
2919 Wire for Lightning Arresters T-533-B.
2920 Wire Chief's Desk—Wall Type #11.
2921 Inspection of a Cant Hook.
2922 Instruction for Use of Creosoted Three Block Anchors.
2931 Pike Poles.
2959 Method for the Analysis of Solder.
2960 Aerial Cable Hangers.
2971 Dowel Pins.
2980 Protection of Telephone Lines Crossing High Potential Lines—Short Span Method of Protection.
2986 Toll Ticket Filing Desk #1.
2987 Toll Directory Desk No. 1.
**2995 Substation Ground Wire.
3001 Transposition Glass Insulators.
3007 Distributing Frame Wire.
(Supplemented by G. E. C. 615)

3011 Inspection of a Long Handle Shovel.
3011 Amendment to Specs. 3011 for the Inspection
[fol. 15431] of Long Handle Shovel.
3012 Inspection of a Digging Spoon.
3021 7000 Pound two-wire galvanized steel Strand.
3030 Treated and untreated square and round conduit plugs.
3040 (Provisional) Installation of Iron Case Loading Coils on Open Wire Lines.
(Supplemented by Specs. 3525)
3049 Steel Prod.
3065 Malleable Castings.
3066 Treated Wrought Pipe and Lap Welded Casing.
3069 Guy Clamps.
(Supplemented by G. E. C. 276 and 561)
3070 Crossarm Bolts.
(Supplemented by G. E. C. 276)
3071 Staples.
(Supplemented by G. E. C. 276)
3074 Rock Guy Bolts.
(Supplemented by G. E. C. 276 and 561)
3076 Extension Fixture Braces.
(Supplemented by G. E. C. 276)
3077 Thimbles.
(Supplemented by G. E. C. 276)
3078 Washers.
(Supplemented by G. E. C. 276)
(Replaced by G. E. C. 1112 Specs. 4149)
3079 Back Braces.
(Replaced by Specs. 4182 (G. E. C. 1201)
3080 Carriage Bolts.
(Supplemented by G. E. C. 276)
3081 Guy Rods.
(Supplemented by G. E. C. 276)
3082 Drive Screws.
(Supplemented by G. E. C. 276)
3094 Weatherproof Copper Wire.
3096 Creosoted Plank.
3097 Strain Insulators.
[fol. 15432]
3103 Instructions for Making Phantom Circuit Transpositions.
(Replacing in part G. E. C. 43)

3110 Galvanizing for Iron and Steel.
3111 Guy Chain.
3115 Creosoting Douglas Fir Duct and Small Douglas Fir Timber.
(Replaced by Specs. 4242)
**3117 Wire Chief's Desk #2.
**3117-A Method of Operation for Wire Chief's Desk #2.
3120 Phantom Circuit Transpositions.
(Replaced in part by Specs. 3736. See G. E. C. 563)
3123 Tin Coating on Copper Wire.
3124 Malleable Iron Clamp.
(Supplemented by G. E. C. 561)
3132 Cribbing Guards. (1908)
3138 Creosoted Plank for Two Block Anchors.
3138 Creosoted Plank for Two Block Anchors Amendment #1 (G. E. C. 1297).
3139 Tamping Bar.
(Replaced by Specs. 4156)
3140 Digging Bar.
(Replaced by Spec. 42041 G. E. C. 1226)
3142 Paper Sleeves for Splicing Paper Insulated Cables.
3145 Making Phantom Circuit Transpositions with Pole Circuits on Adjacent Arms as Side Circuits.
3146 Phantom Circuit Transpositions with Pole Circuits as Side Circuits.
(Replaced in part by Specs. 3736. See G. E. C. 563)
3152 Wooden Pole Steps.
3153 Crossarm Paint.
3154 Provisional Specifications for Long Open Wire Spans at River Crossings.
3156 Creosoting Timber.
3163 Galvanized Best-Best Iron Wire.
3164 Galvanized Steel Wire.
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3166 Installation and Operation of Pole Relays #191-A.
3167 Galvanized Steel Wire for River Crossings.
*3176 Installation of Local Telegraph Sounders.

3178 Serving Iron (For binding iron wire over the armor wires in Sub. Cable).
3180 Lightning Arrester T-533-B.
3184 Steel Cable Crossarms Nos. 1, 2 and 3.
3187 Provisional Specifications for the Installation of Bridle Wire Electrose Insulators.
3188 Standard Black Pole Paint.
3189 Standard White Pole Paint.
3194 Pole Line Brackets.
3195 Wooden Tree Blocks.
3196 Galvanized Bridle Rings.
3197 Cable Rack.
3198 Hooks for Cable Racks.
3200 Galvanized Pole Brackets.
(Supplemented by G. E. C. 276)
3200 Amendment to Specs. No. 3200—Galvanized Pole Brackets.
3203 Crossover Clamps.
(Supplemented by G. E. C. 276 and 561)
3204 Steel Angle Support for Long Span Wire Hanger on Pole Fixture.
3210 Bridle Cable Hanger.
•3211 Stub Reinforcement for Poles.
(Replaced by Spec. 3926)
3212 Single and Twisted Pair Braided Rubber Covered Wire for Morse Circuits.
3213 Galvanized Strain Plates.
(Supplemented by G. E. C. 276)
3216 Transposition Bracket for Double Petticoated Porcelain Insulators.

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3231 Creosoted Yellow Pine Crossarms.
(Supplemented by G. E. C. 284 and 583)
3232 Creosoting Yellow Pine Crossarms. (1911)
3234 Creosoted Yellow Pine Stubs for Pole Butt Reinforcements.
•3235 Exchange Aerial Construction.
(Supplemented by G. E. C. 178, 193, 257, 441, 452, 630 and 641)
(Supplemented by Specs. 3636)
3237 Tree Wire.
3252 Insulation and Operation of Composite Ringing Set for Tel. Lines.
(Replaced by G. E. C. 1294)

3254 Eastern White Cedar Poles. Amendment No. 1 (G. E. C. 1133).

3254 Eastern White Cedar Poles. Amendment No. 2. (Replaces Amend. No. 1)

3258 Preliminary Specifications for the Installation of Iron Case Loading Coils on Phantom Open Wire Lines for Phantom Circuits 1-2-3-4, 3-4-5-6, 5-6-7-8 and 7-8-9-10.
(Supplemented by Specs. 3525, 3620 and 3751)

3265 Preliminary Specifications for the Installation or Iron Case Loading Coils T-685 on Open Wire Lines for Circuits 1-2 and 3-4 and Corresponding Circuits on Other Arms. Arranged so that Phantom Coils T-680 may be installed on these circuits at some Future Time.
(Supplemented by Specs. 3525, 3620 and 3751)

3276 Toll Line Glass Insulators.

3278 Preliminary Specifications for the Installation of Phantom Loading Coils T-680 on Open Wire Lines for Phantom Circuit 5-6-7-8 and Corresponding Circuits on Other Arms. Arranged so that Loading Coils T-685 may be Installed on These Circuits at Some Future Time.
(Supplemented by Specs. 3525, 3620 and 3751)

3286 Inspection of Worn #49 Jacks.

3287 Inspection of Worn Plugs #109 and #110.

3291 Installation of Phantom Loading Coils T-680 on Open Wire Lines for Phantom Circuits 1-2-3-4, 3-4-5-6 and 7-8-9-10 and Corresponding Circuits on Other Arms. Arranged so that Loading Coils T-685 may be Installed at Some Future Time.
(Supplemented by Specs. 3525, 3620 and 3751)

3292 Beeswax Compound.

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3295 Galvanized Pole Steps.
(Supplemented by G. E. C. 276)
(Replaced by Spec. No. 4146)

3297 Galvanized Aerial Cable Rings.
(Supplemented by G. E. C. 649)

3298 Galvanized Pothead Support.
(Supplemented by G. E. C. 276)

3299 Cotton Sleeving.

3302 Pole Tongs.

3316 Galvanized House Bracket for Dead-Ending Copper-Steel Drop Wires.
(Supplemented by G. E. C. 276)
(Amend. No. 1 G. E. C. 1245)

3326 Cable Suspension Clamps.
(Supplemented by G. E. C. 276 and 561)

3327 Instructions for Placing Loading Coil Cases and Connecting Loading Coils to Underground Cable Conductors used in Parallel.

3328 Galvanized Corner Bridle Rings.
(Replaced by Spec. 4244) G. E. C. 1315.

3343 Exchange Line Glass Insulators.

3347 Weatherproof Iron and Steel Wire.

3348 Wooden Insulator Pins.
(Supplemented by G. E. C. 613)

3352 Creosoted Wood Conduit.

3355 Vitrified Clay Conduit.

3356 No. 22 Gauge Cable.
(Replacing Specs. 3226)

3357 No. 19 Gauge Cables.
(Replacing Specs. 3227)

3371 Preliminary Specifications for the Installation of a #44-C Retardation Coil on Open Wire Circuits to Obtain a Rural Line Phantom.

3381 Western White Cedar Poles and Guy Stubs.

3382 Galvanized Bolts for Cable Suspension Clamps.
(Supplemented by G. E. C. 276 and 561)
(Replaced by Specs. 4197—G. E. C. 1271)

3385 Galvanized Sheet Iron Cable Shields.

[fol. 15436]

3393 Sawed Redwood Poles.

3396 Dipping Douglas Fir Crossarms in Hot Carbolineum.

3397 Painting Crossarms (1912).

3414 Specifications for Overhead Crossings of Electric Light & Power Lines.

3426 Porcelain Knobs (See G. E. C. 1299 for Issue #4 of Dwg. 89-E5 to Specs. 3426).

3428 Insulating Sealing Compound.
3431 Carbolineum and Similar Wood Preserving Oils.
(Supplemented by G. E. C. 512 and 581)
3432 Analysis of Carbolineum and Similar Wood Preserving Oils.
3436 Toll Test Board #4. Description of Apparatus and Methods of Testing.
3438 40-60 Solder.
(Supplemented by G. E. C. 568) (1911)
3438 Amend. to Specs. 3438—40-60 Solder.
3439 45-55 Solder.
(Supplemented by G. E. C. 568)
3439 Amend. to Specs. 3439—45-55 Solder.
3440 50-50 Solder.
(Supplemented by G. E. C. 568)
3440 Amend. to Specs. 3440—50-50 Solder. (Amend No. 2 G. E. C. 1099.)
3441 Rosin Flux Wire Solder.
3441 Amend. to Specs. 3441 Rosin Flux Wire Solder.
} Replaced by Specs. 4152
3443 Pothead Wire.
3444 Installation and Maintenance of an Automatic Switch in Electrolysis Drainage Wires.
3445 Toll Test Board #4.
3446 Wheatstone Bridge #111077—Toll Test Board #4.
3448 Cement.
3449 Inspection of Cement.
3455 Lead-Antimony Cable Sheath.

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3504 Double Petticoated Glass Insulators.
3505 Rack for Composite Sets and Composite Ringer Sets.
3522 Replacement and Reinforcement Inspection of Pole Lines.
(Supplemented by G. E. C. 685)
3525 Preliminary Specifications for the Installation of Loading Coils T-300, T-680, T-685 on Open Wire Lines.
(Supplementing Specs. 3040, 3258, 3265, 3278 and 3291)
3529 Crossarm Braces.
3531 Hub Guards.

3535 Voltmeter No. 12002 used with Toll Test Board No. 4.
(Replacing Specs. 3171)

3536 Mil-Ammeter No. 111076 used with Toll Test Board No. 4.

3537 Volt-Mil-Ammeter No. 121037 used with Morse Board No. 4.

3542 Master Specifications for Single Armored Submarine Cable with Single Wrapped Conductors.
(Replacing Specs. 2159)

3543 Master Specifications for Double Armored Submarine Cable with Single Wrapped Conductors.
(Replacing Specs. 2159)

3544 Master Specifications for Double Armored Submarine Cable with Double Wrapped Conductors.
(Replacing Specs. 2159 and 3361)

3545 Master Specifications for Single Armored Submarine Cable with Double Wrapped Conductors.
(Replacing Specs. 2159 and 3362)

3546 No. 17 Gauge Tinned Copper-Steel Wire.

3549 One Point Transposition Brackets.
(Replacing Specs. 3106)

3550 Steel Pins for Transposition Brackets.
(Replacing Specs. 3060 and 3225)
(Supplemented by G. E. C. 561)

3551 Composite Sets for Telephone Lines.
(Replaced by Specs. 4064)

3554 Artificial Cables for Use in Transmission Testing.

3558 Bridge Polar Duplex Telegraph System.
(Replacing Specs. 3174)
(Supplemented by G. E. C. 631, 633 and 645)

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**3559 No. 1-B Telegraph Repeater Set.

3560 Equipment for Public News Telephone Service.

*3613 Underground Conduit Construction.
(Replacing Specs. 2891 and 3509)

3617 (Confidential). Preliminary Specifications for the Installation of Phantom Circuit Loading Coils No. 511 (T-680), Side Circuit Loading Coils No. 512 (T-685) and Lightning Arresters (T-533-B) on Open Wire Lines for Circuits 5-6-15-16 and Corresponding Circuits on Other Arms.
(Supplemented by Specs. 3751)

3620 (Confidential). Preliminary Specifications for the Installation of Loading Coils No. 511 (T-680) and No. 512 (T-685) on Open Wire Lines, Spacing Coils and Grouping Coils at Loading Points.
(Supplementing Specs. 3258, 3265, 3278 and 3291)

3623 Installation and Operation of Simplex Sets.
(Replacing Specs. 3557)

3626 Provisional Specifications for Lead Sleeving.
(Replacing Specs. 3018)
(Replaced by Specs. 4279)

*3627 Provisional Specifications for the Brush Treatment of Poles.

3629 (Confidential). Preliminary Specifications for the Installation of Phantom Circuit Loading Coils No. 511 (T-680), Side Circuit Loading Coils No. 512 (T-685) and Lightning Arresters (T-533-B) on Open Wire Lines. "H" Fixture Construction Along the Line. (1914)

3634 Standard Intermediate Distributing Frames.

3636 Crossings of Wires or Cables of Telegraph, Telephone Signal and Other Circuits of Similar Character over Steam Railroad Rights of Way, Tracks or Lines of Wire of the Same Classes.
(Supplementing Specs. 2851, 2877, 2942 and 3235)
(Supplemented by G. E. C. 530)
(Replaced by Specs. 4190)

*3639 Transposing Single and Phantom Circuits and Dead-Ending Wires at Test and Terminal Poles, Each Wire Attached to a Separate Insulator.
(Replacing Specs. 3293)
(Replaced in Part by Specs. 3928)

3640 Specifications for Ringing Dynamotors.
(Replacing Specs. 3246)

3641 Specifications for Ringing Generators.
[fol. 15439] (Replacing Specs. 3245)

3642 Specifications for Direct-Current Motors.
(Replacing Specs. 3510)

3643 Provisional Specifications for a Concrete Steel Reinforcement for Poles.
(Replacing Specs. 3284)

3644 Provisional Specifications for Gray Iron Castings.
(Replacing Specs. 3064)

3645 Provisional Specifications for Manhole Frames and Covers.

3646 Provisional Specifications for Conduit Castings.

3646 Provisional Specifications for Conduit Castings, Amend No. 1.

3647 Provisional Specifications for Reducing Couplings.

3647 Provisional Specifications for Reducing Couplings, Amend No. 1.

3647 Provisional Specifications for Reducing Couplings, Amend No. 3.

3648 Provisional Specifications for Cast Iron Pipe Bend.

3649 Provisional Specifications for Pulling-In Iron.

3650 Specifications for No. 22 Gauge Lead-Covered Silk and Cotton Insulated Cable Without Color Code.

3651 Specifications for No. 22 Gauge Lead-Covered Silk and Cotton Insulated Cable With Color Code.

3652 Specifications for Filled No. 22 Gauge Lead-Covered Silk and Cotton Insulated Cable With Color Code. (1913)

3654 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B) and Lightning Arresters T-533-B for Circuits 1-2-3-4 and Corresponding Circuits on Other Arms.
(Supplemented by Specs. 3683). (Jan. 1914)

3655 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B) and Lightning Arresters T-533-B for Circuits 1-2-3-4 and Corresponding Circuits on Other Arms. Instructions for Replacing Coils Nos. 511 and 512 (T-680 and T-685) on Existing Fixtures.
(Supplemented by Specs. 3683)

3656 Master Specifications for Armored Submarine Duplex Cable.
(Replacing Specs. 3478). (1914)

**3657 Composite No. 19 and No. 22 B & S Gauge Duplex Cable (1914).

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**3658 Provisional Instructions for Installing Duplex Cable Using Capacity Unbalance Testing Sets.
(Replacing Specs. 3527) (1914)

**3660 Master Specifications for Duplex Cable
(Replacing Specs. 3380) (1914)

3661 Standard Fuse Boards. (1914)

3662 Standard Subscribers' and Trunk Coil Racks (1914).

3662 Standard Subscribers' and Trunk Coil Racks, Appendix No. 1.

3663 Duplex No. 19 and No. 16 B & S Gauge Lead-Covered Silk and Cotton Insulated Cable.
(Replacing Specs. 3530) (1914)

*3664 Transposing Phantom Circuits Made Up of Pole Circuits on Adjacent Arms, Terminating Wires at Test Poles and Terminal Poles, Each Wire Attached to a Separate Insulator.

3665 Specifications for Charging Generators for Storage Batteries.
(Replacing Specs. 3513). (1917)

3667 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B and Lightning Arresters T-533-B for Circuits 3-4-5-6, 5-6-7-8 and 7-8-9-10 and Corresponding Circuits on Other Arms.
(Supplemented by Specs. 3683)

3667 Appendix No. 1 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B) and Lightning Arresters T-533-B for Circuits 4-5-6-7 and Corresponding Circuits on Other Arms.
(Supplemented by Specs. 3683)

3668 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B) and Lightning Arresters T-533-B for Circuits 3-4-5-6, 5-6-7-8, 7-8-9-10 and Corresponding Circuits on Other Arms. Instructions for Replacing Coils Nos. 511 and 512 (T-680 and T-685) on Existing Fixtures.
(Supplemented by Specs. 3683)

3669 Cleaning and Testing Transmitters and Receivers at Storerooms. (1914)

3674 Standard Relay Racks.
(Replacing Specs. 3637)

3681 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Side Circuit

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Loading Coils No. 550 (Case No. 20-F) and Lightning Arresters T-533-B for the Following Circuits and Corresponding Circuits on Other Arms.

1-2, 3-4
3-4, 5-6
5-6, 7-8
7-8, 9-10
5-6, 15-16

Odd Circuits
1-2, or 5-6
or
9-10

3682 Manila Rope.
(Replaced by Specs. 4218)

3683 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coils Nos. 549 and 550, Case No. 26-B) Attaching Three-Coil Unit to Pole. Guying Single Poles and "H" Fixtures Across the Line. (1914)
(Supplementing Specs. 3654, 3655, 3667 and 3668)

3685 Railroad Private Branch Exchange. Description of Equipment. (1914)

3686 Guy Hooks.
(Replacing Specs. 3121) (1915)

3697 Storage Batteries.— Chloride Accumulator Type.
(Replacing Specs. 2004)
(Replaced in part by G. E. C. 646)

3698 Emergency Toll Equipment. (1915)

3729 No. 22 Gauge Cable (Small Diameter Type).
(Replacing Specs. 3630)
(Replaced by Specs. 4130 (G. E. C. 1346))

3734 Instruction Governing the Use of Dynamite.

*3736 Locating Transpositions—Standard System.
(Replacing in part Specs. 3120 and 3146)
(Supplemented and Replaced in part by Specs. 3897)

3739 Specifications for Type "C" Porcelain Knobs.

3739 Specifications for Type "C" Porcelain Knobs, Amend. No. 1

3743 Dead Oil of Coal Tar or Coal Tar Creosote.
[fol. 15442] (Replacing Specs. 3340)

3744 Analysis of Dead Oil of Coal Tar or Coal Tar Creosote.
(Replacing Specs. 3339)

Memorandum Specifications Covering the Construction of Overhead Crossings of High Tension and Telephone Lines. Mar. 15, 1916.
(Replacing Specs. 3414)

3745 Specifications for Break Iron.
(Replacing Specs. 3224)

3746 5/8 Inch Steel Insulator Pins.

*3750 The Care and Operation of Storage Batteries.
(Replacing Bulletin 17, "Storage Batteries")

3751 Installation of New Type Break Irons and Old-Type Break Irons with Steel Pins at Loading Points.
(Supplementing Specs. 3258, 3265, 3278, 3291 and 3617)

3752 Installation of Old Type Break Irons Equipped with Steel Pins at Test and Terminal Poles.

3754 Standard Message Register Racks and Casings
(Replacing Specs. 3659 — Preliminary Draft)

3754 Standard Message Register Racks and Casings (Appendix No. 1).

3755 Local Test Desk No. 12.

3756 Local Test Desk No. 12—Description and Method of Operation.

3760 Master Specifications for Composite Cable (Non-Duplex).
(Replacing Specs. 3375)

3761 Specifications for Message Register Generators.
(Replacing Specs. 3633)
(Replaced by G. E. C. 1348—Bulletin #99)

3762 Specifications for Alternating-Current Induction Motors.
(Replacing Specs. 3511)

3763 Specifications for Repulsion—Induction Motors.
(Replacing Specs. 3512)

3767 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Three-Coil Unit (Coil Nos. 549 and 550, Case No. 26-B) and Lightning Arresters T-533-B for Circuits 5-6-15-16 and Corresponding Circuits on other Arms.

3768 (Confidential). Provisional Specifications for the Installation of Loading Coils on Open Wire Lines. Installation of Phantom Circuit Loading Coils No. 549 (Case No. 20-G) and Lightning Arresters T-533-B for the Following Circuits and Corresponding Circuits on Other Arms.

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1-2, 3-4
3-4, 5-6
5-6, 7-8
7-8, 9-10
5-6, 15-16

3769 Description of Central Office Equipment with Magneto Switchboard No. 105-A.
(Replacing Specs. 1820)

3770 Preliminary Specifications for the Construction of Toll Pole Lines.
(Replacing Specs. 2851, 2942 and 3269)
(Supplemented by G. E. C. 697)
(Replaced in Part by Spec. 3927)
(" " " " " 3928)

3770 Appendix A. Preliminary Specifications for the Construction of Twenty, Ten and Two-Wire Toll Pole Lines.
(Replacing Specs. 2851, 2942 and 3269)
(Supplemented by G. E. C. 697)
(Replaced in part by Spec. 3927)
(" " " " " 3928)

3771 Instructions for Making Insulating Joints in Lead-Covered Paper Insulated Cable.
(Replacing Specs. 2883)

3772 Main Frame Protection—"B" Type Frames

3773 " " " —"A" " "

**3774 Substation Protection—Including P.B.X.

3778 1212 Pair, No. 24 Gauge Cable.

3782 Dead Oil of Coal Tar for Brush and Open Tank Treatments.
(Replacing Specs. 3430)

3783 Liquid Grade Dead Oil of Coal Tar.

3787 Preliminary Specifications for Underground Cable Placing.

3788 Preliminary Specifications for Splicing Lead-Covered Paper Insulated Cables.
(Replacing Specs. 2385, 2494, 2576, 3170 and 3178)

3789 Specifications for Tinned Steel Sleeves.

3791 Duct Shields.
(Replacing Specs. 3218)

3794 Rubber Insulated Lead-Covered Cable.
(Replacing Specs. 3193)

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3795	Creosoted Rock Elm Insulator Pins. (Replacing Specs. 2528 and 2529)
3796	No. 19 B & S Gauge Duplex Cable.
3799	Ground Rods. (Replacing Specs. 1990 and 2375)
3800	No. 22 Gauge Cable (Aerial Type, Replacing Specs. No. 3356).
3801	No. 14 Gauge Hard-Drawn Copper Outside Distributing Wire. (Replacing Specs. 2849 and 3261)
3802	No. 17 Gauge Copper Steel Twisted Pair Outside Distributing Cable. (Replacing Specs. 3534)
3803	Bridle Wire (Replacing Specs. 3420).
3804	No. 14 Ground Wire.
3804	" " " " Amendment No. 1.
3805	Inside Wire. (Replacing Specs. 3047) (Amend. No. 2)
3805	Short Lengths of Inside Wire—Amendment No. 1
3816	Cable Racks and Hooks. (Replacing Specs. 3197 and 3198)
3817	Tinned Copper Sleeves for Cable Conductors. (Replacing Specs. 3399)
3818	Cotton Sleeving (Replacing Specs. 3299).
3818	Cotton Sleeving (Replacing Specs. 3299). Amend. No. 1.
3836	Standard Main Distributing Frames. (Replacing Specs. 3624)
3836	Standard Main Distributing Frames. (Replacing Specs. 3624) (Appendix No. 1)
3838	Douglas Fir Crossarms. (Replacing Specs. 3395)
3838	Douglas Fir Crossarms. (Replacing Specs. 3395) Amendment to Specs. 3838.
3841	Aerial Cable Safety Straps. (Replacing Specs. 3263)
*3850	Substation Protector Installation. (Replacing in part Specs. 2181) (Replaced by Specs. 4170)
*3851	Substation Apparatus.

[fol. 15445]

*3852 Substation Apparatus Installation.
(Replacing in Part Specs. 2181)

*3852 Substation Apparatus Installation.
(Replacing in part Specs. 2181) (Supplement "A").

*3853 Substation Wiring.
(Replacing in part Specs. 2181)

*3853 Substation Wiring.
(Replacing in part Specs. 2181) (Supplement A—G. E. C .#1235)

*3854 Substation Connections.
(Replacing in part Specs. 2181)

*3855 Adjustment of Substation Apparatus.

*3856 Substation Sign Installation.

*3857 No. 50 Coin Collector Installation.

*3857 No. 50 Coin Collector Installation—Supplement "A".

*3858 No. 50 Coin Collector Maintenance.

*3859 Substation Wiring Plans.

*3862 Telegraph Substation Installation.

*3862 Telegraph Substation Installation — Supplement "A".

3880 (Confidential). Preliminary Specifications for the Installation of "Building Out" Condensers on Open Wire Lines.
(Supplemented by Specs. 4024)

*3881 Main Frame Protection—"B" Type Frames.

*3882 Main Frame Protection—"A" Type Frames.

3883 Specifications for Double Tube Copper Sleeves.
(Replacing Specs. 2966)

3885 Creosoted Yellow Pine Poles.
(Replacing Specs. 3239)
(Replaced by Specs. 4209)

3886 Provisional Specifications for Adhesive Insulating Tape.
(Replacing Specs. 2962 and 3185)
(Replaced by Spec. 4183) (G. E. C. 1203)

3886 Amendment to Specification No. 3886—Adhesive Insulating Tape.

3892 Prov. Specs. for Vitrified Clay Sewer Pipe.

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*3897	Preliminary Specifications for Locating Telephone Circuit Transpositions. Exposed Line Transpositions System. (Supplementing and Replacing in Part Specs. 3736)
3899	Provisional Specifications for the Butt Treatment of Poles. (Replacing Specs. 2977)
3900	General Specifications for Equipments for United States Military Mobilization Camps—One Infantry Division.
3900	Appendix No. 1—General Specifications for Equipments for U. S. Military Mobilization Camps—One Infantry Division.
*3912	General Cable Splicing. (Replacing Specifications No. 3771 and in part Preliminary Specifications 3788)
*3912	General Cable Splicing—Supplement A Joints in conductors.
*3912	General Cable Splicing—Supplement B—Cable Transfer.
*3912	General Cable Splicing—Supplement C—Splicing Material for 24 Gauge Cable.
*3912	General Cable Splicing—Supplement D—Detecting Defective Pairs.
*3912	General Cable Splicing—Supplement E—Work in Machine Switching Lines.
*3912	General Cable Splicing—Supplement F—Lead Sleeves for 455 Pair 19 Ga. Cable.
*3913	Underground Cable Splicing. (Replacing in part Pre. Specs. 3788)
*3914	Aerial Cable Splicing. (Replacing in part Preliminary Specs. 3788)
*3914	Aerial Cable Splicing — Supplement "A"—Loading Coil Stub Cables.
*3915	Block Cable Splicing.
*3916	House Cable Splicing.
*3918	Substation Protection Including Private Branch Exchanges.
3920	Description of Central Office Equipment with Magneto Switchboard No. 105-B.

3921 Preliminary Specs. for the Construction of Wood Pole Lines used Jointly for Supply Circuits and Signal Circuits.
(Replacing Spec. 2651)

3923 Storage Batteries—chloride accumulator Type.
(Replacing Spec. No. 3697)

3925 Strand Connectors.

*3926 Pole Line Construction.
(Replacing Spec. No. 3211 and Amend. No. 1 to Spec. 3211)
(Replacing in part Spec. No's. 2877, 3235, 3770 and Appendix A to Specs. 3770)

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*3927 Guying.
(Replacing in part Specs. 2842, 2877, 3235, 3770 and Appendix A and 3929)

*3927 Guying—Supplement A—Guy Clamp—1 Bolt Clamp.

*3928 Open Wire Construction (G. E. C. 1134).
(Replacing in part Specs. 2842, 2877, 3235, 3639, 3770 and Appendix A to Spec. 3770)

*3929 Aerial Cable Construction.
(Replacing in part Spec. 3235)
(Replaced in part by Spec. 3927)

*3929 Aerial Cable Construction—Supplement A—24 Gauge Cable.

*3929 Aerial Cable Construction—Supplement B—455 Pair 19 gauge cable.

*3929 Aerial Cable Construction—Supplement C—Guy Clamp Attaching Braces for Multiple Spindle Loading Pots.

*3929 Aerial Cable Construction—Appendix 1—Use of B and C Cable Balconies with F.X. Terminals.

*3930 Drop Wiring.
(Replacing in part Specs. 3235)

*3930 Drop Wiring—Appendix 1—Multiple Fusing in Underground Cable Terminals.

*3931 Block Cable Construction.
(Replacing in part Specs. 3235)

*3931 Block Cable Construction—Supplement A—24 Gauge Cable.

*3931 Block Cable Construction—Supplement B—Guy Clamp—1 Bolt Clamp.

*3932 Block Wiring.
(Replacing in part 3235)

*3933 House Cable Placing.

*3933 House Cable Placing — Supplement A — 24 Gauge Cable.

*3933 House Cable Placing—Supplement B—Guy Clamp—1 Bolt Clamp.

*3935 New Designations for Wires and Sleeves.

3936 Douglas Fir Guard Arms.
Amendment No. 1 (See G. E. C. 1404)

3937 Creosoted Yellow Pine Guard Arm.
Amendment No. 1 (See G. E. C. 1404)

3943 Reinforcing Links.

3950 Guy Rods.

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3951 Guy Rods Integral to Patent Guy Anchors.

3952 Galvanized Wood Screws.

3955 Hand Magazine for Dynamite.
(Replacing Specs. 2244)

3956 Hand Magazine for Electric Blasting Cap.

3971 Wooden Pole Steps.
(Replacing Specs. 3152)

3971 Wooden Pole Steps—Amendment No. 1.

3972 Wooden Pole Brackets.

3973 Tree Blocks.
(Replacing Specs. 3195)

3974 Creosoted Pine Stubs.
(Replacing Specs. 3234)

3977 Eucalyptus Insulator Pins.

3978 2,200 Pound Strand.

3989 Provisional Specs. for Paraffin.

3998 Instructions for Using Correctness of Loading Testing Set in Installing Loading Coils.

4001 Standard Fuse Boards.
(Replacing Specs. 3661)

4003 Tin coating on Copper Wire.
(Replacing Specs. 3123)

4006 Specs. for Transposition Glass Insulators.
(Replacing in part Specs. 3001 and 3036)

*4009 Care of Trailer Axle Bearings.

*4010 Operation of Cable Reel Trailer.

4017 Second Grade Locust Pins.

*4018 First Aid.

4024 Installation of "Building-Out" Condensers on Open Wire Lines. Condensers Potted in No. 20-A Open Wire Loading Coil Case.
(Supplementing Specs. 3880)

*4032 Underground Cable Placing.
(Replacing Specs. 3787)

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*4032 Underground Cable Placing.
(Supplementing Spec. 4032)

*4033 Tree Pruning.
(Replacing Preliminary Specs. 4002 and G. E. C. 346)

4036 Thimbles.
(Replacing Specs. 3077)

*4039 Cable Terminating.

*4040 Jointly Used Wood Pole Lines Carrying Supply Circuits and Signal *Signal* Circuits.
(Replacing Specs. 3921)

4041 Porcelain Strain Insulators.
(Replacing Specs. 3097)
(Amend. No. 2 See G. E. C. 1816)

4048 Drive Screws.

*4054 Outside Plant Symbols.

4055 Reinforcing Strap.

4056 Distributing Frame Wire.
(Replacing Specs. 3007)

4056 Distributing Frame Wire—Amendment No. 1.

4063 No. 19 Gauge Cable 455 Pairs (BNB) Type.

*4064 Arrangements for obtaining simultaneous Telephone and Grounded Circuit Telegraph Operation.

*4065 Telegraph Circuits at No. 4 Morse Board and Test Board.

*Form E-268 Revised Dec. 22, 1922—List of Specs. included in Handbook of Central Office Telegraph Practice.

*4066 Bridge Polar Duplex Telegraph System.
(Replacing Specs. 3558)

*4067 Telegraph Power Supply.

*4068 Single Morse Telegraph System.

4069 Houseline.

4070 Body Belt and Safety Strap.
(Amendment No. 1 See G. E. C. 1327)

4074 Dowel Pin.
(Replacing Specs. 2971)

4075 B First Aid Box.
(Replaced by Spec. 4259)

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4076 B Cardboard Container.
(Replaced by Spec. 4254)

4077 C Cardboard Container.
(Replaced by Spec. 4254)

4078 4 in. Compress.
(Replaced by Spec. 4268)

4079 3 In. Compresses 2 Per Package.
(Replaced by Spec. 4267)

4080 1½ In. Compresses 6 Per Package.
(Replaced by Spec. 4266)

4081 Absorbent Gauze Compress.
(Replaced by Spec. 4269)

4082 Triangular Bandage.
(Replaced by Spec. 4273)

4083 6 In. Bandage.
(Replaced by Spec. 4272)

4084 Iodine Swabs 10 per Package.
(Replaced by Spec. 4274)

4085 Ammonia Inhalants 10 per Package.
(Replaced by Spec. 4275)

4086 Carbolated Petrolatum Tubes 6 Per Package
(Replaced by Spec. 4276)

4087 Tourniquet.
(Replaced by Spec. 4255)

4088 Wire Splint.
(Replaced by Spec. 4277)

4089 Spacer for B First Aid Box.
(Replaced by Dwg. #46-L-220 G. E. C. 1363)

4090 C First Aid Box.
(Replaced by Spec. 4260)

4091 D First Aid Box.
(Replaced by Spec. 4261)

4092 3 In. Compress 1 Per Package.
(Replaced by Spec. 4267)

4093 1½ In. Compress 1 Per Package.
(Replaced by Spec. 4266)

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4094 Iodine Swab 1 Per Package.
(Replaced by Spec. 4274)

4095 Ammonia Inhalant 1 Per Package.
(Replaced by Spec. 4275)

4096 Carbolated Petrolatum Tube 1 Per Package.
(Replaced by Spec. 4276)

4097 Cable Terminal Wire.
(Replacing Specs. 3450)

4099 Rock Guy Anchors.
(Replacing Specs. 3074 and 1721)

*4100 Preliminary Specification on Machine Switching Substations.
(Replaced by Spec. 4160)

4104 Creosoted Wood Conduit.
(Replacing Specs. 3352)

4105 Creosoted Plank.
(Replacing Specs. 3096)

4106 Sleeve Twisters.
(Replacing Specs. 2052)

4107 Steel Cable Crossarm.
(Replacing Specs. 3184)

4108 CL Tree Wire.
(Replacing Specs. 3237)

4109 WP Copper Wire.
(Replacing Specs. 3094)

4110 Bridle Rings.
(Replacing Specs. 3196)
(Amend. No. 1 See G. E. C. 1402)

4114 Exchange Insulators.
(Replacing Specs. 3343)

4115 Toll Insulators.
(Replacing Specs. 3276)

4116 D.P. Insulators. G. E. C. #1115 Transmits Revised Dwg. Issue #3 to Dwg. 46-L-20 "DP" Insulators.
(Replacing Specs. 3504)

4120 The Submersion Treatment of Poles.

4121 The Butt Treatment of Poles.
(Replacing Specs. 3899)

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4122 The Perforation Treatment of Poles.
(Replacing Specs. 3899)

4123 "NM" Cable (24 Ga.)

4124 "ANA" Cable (#22 Ga.)
4125 "ANB" Cable (#19 Ga.)
4126 Ground Rods.
(Replacing Specs. 3799)
4127 Muslin.
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4133 Strain Plates.
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4135 Copper Wire.
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4137 Tinned Steel Sleeves.
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Bulletin No. 84

American Telephone and Telegraph Company

Department of Development and Research

"22" Type Panel Mounted Telephone Repeaters

(Reading Type)

Confidential

Copy No. —

Approved J. J. Carty, Vice President

[fol. 15469] (Reprint)

Telephone Repeater Data

Section 6-E

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0. General.

0.1. Introduction.

The telephone repeaters and circuits described in the Notes accompanying G. E. C. No. 714 "Telephone Repeaters" were designed, primarily, for use on open wire lines and are not well adapted for offices where a large number of repeaters are employed. With the introduction of long toll cables requiring large repeater stations, it became necessary to develop means for decreasing the floor space required for the repeater equipment and to provide more

efficient methods for maintaining the repeater circuits. In order to do this the battery supply equipment and the jacks for testing and patching the repeater sets were dissociated from the repeater unit, which, together with the use of smaller coils, permitted two repeater circuits to be mounted on one floor type rack. The battery supply equipment together with the meter cord circuits for measuring the currents and voltages were located at a central meter panel while the jacks for testing and patching the repeater sets together with the testing equipment were located in a No. 4 toll test board section. This arrangement was employed in a few of the earlier cable offices.

In order to further simplify the repeater circuits for large installations a sectional unit mounting method adapted to the standard relay rack has been developed for telephone repeaters. With this arrangement the apparatus of the repeater set is assembled on a panel, capable of being mounted on vertical bays employing the standard relay rack spacings, drillings, etc. The jacks for testing and patching the repeater sets, the testing equipment, etc., are also assembled on panels which are mounted on the same [fol. 15475] bays with the repeater sets. The battery supply equipment is located separately as, in the case of the earlier cable offices, except that it is also arranged to mount on vertical bays employing the same dimensions as the standard relay rack and cordless meter circuits are employed as will be explained in Section 2.3. Arrangements have also been provided so that the filaments of two repeaters may be connected in series when desired.

0.2. Field of Use.

The relay rack repeaters described herein are designed primarily for use only on heavy or medium-heavy loaded cable circuits and no manufacturing information has been issued covering repeater sets arranged for medium loaded or non-loaded impedance. Also since a separate storage battery is invariably provided in cable type offices for supplying the space current, these repeaters are not arranged for use with a variable potential "B" battery. It is intended therefore that the repeaters described herein be used in general only in cable offices where a relatively large number of repeaters are required. They may be used however on open wire lines in certain cases, such as at the junction of

cable and open wire, or where a cable is soon to be placed, if there is appreciable economy in doing so.

1. Transmission Features.

1.1. General.

The transmission circuit of this panel mounted repeater is shown on Drawing No. 906-278. This set is made up with a single impedance of 1,800 ohms only. It is, in general, suitable only for use on heavy or medium-heavy loaded circuits. Further, the sets are adapted for use with constant potential 130-volt "B" battery only.

[fol. 15476] 1.2. Comparison with Unit Rack Floor Type Sets.

Comparison of this circuit with that of the unit rack floor type repeaters described in G. E. C. No. 714 and shown on Drawing No. 172-BX-40 will disclose the following differences.

1.21. High Frequency Filter.

The filter on the repeater per Drawing No. 906-278 is made up with three coils and two condensers instead of three coils and three condensers as in the old repeater. In the new repeater multi-section paper condensers have been employed for the capacities and a new mounting arrangement has been employed so that the bulk of the filter is materially reduced.

1.22. Potentiometer.

The panel type repeater has a low resistance potentiometer (900 ohms) connected on the low side of the input transformer instead of a high resistance potentiometer connected across the high windings of this coil. Because of its connection in the new location, a balanced potentiometer is required. However, on account of its low impedance, its size and cost have been materially reduced. This low resistance potentiometer has nine steps, the gain change produced by going from one step to an adjacent step being two miles. Drawing No. 906-1090 shows the resistance values of this potentiometer.

1.23. Input Transformer.

Input transformers of small dimensions have been substituted for the old type transformers which were very large.

The new transformer has an impedance ratio of 900 to 350,000 instead of 900 to 600,000 as in the former input coil.

[fol. 15477] 1.24. Condenser Shunt to Ground.

In the panel type set, a small condenser is connected between the midpoint of the potentiometer and ground. This serves to overcome the effect of the internal unbalance in the repeater set. This tends to improve the quality slightly, but its principal advantage lies in the fact that it permits the making of more reliable 21 tests. (The special 21 tests described in G. E. C. No. 891, "Telephone Repeaters—Improved 21 Circuit Test for Balance" are referred to here.)

1.25. Crosstalk Suppressors.

When the filament circuits of two repeaters are connected in series it is necessary to provide a means for reducing the crosstalk that results from the connection of the four tubes in series. By the use of the condensers connected across the filament of each tube, and connecting one side of the output transformer to the mid-point of these condensers the crosstalk is sufficiently reduced. (See bulletin No. 68).

1.26. Battery Supply.

On Drawing No. 906-1091 is shown a schematic diagram of the battery supply circuits with the filament circuits of two repeaters connected in series. Different values of resistance are required in the different "B" battery leads to maintain the same potential difference between the plate and filament of each tube since the potential of the filament to ground for each tube is 4.5 volts greater than the adjacent tube nearer ground.

[fol. 15478] 1.27. Signaling.

In the unit rack floor mounted repeaters the receiving signaling relays are connected across the bridge points of the output transformer. In order to improve the signaling, which is particularly essential when d. c. metallic telegraph is worked on the circuits, the relays for receiving the ringing current are bridged across the lines instead as shown on Drawing No. 906-278. In order to reduce the shunting effect of the repeater circuit on these relays, balanced 2-mf. condensers are inserted between the relay and the repeater. The principal effect which these condensers have on transmission is to reduce the efficiency of the repeater at low

frequencies. In order to preserve balance, a similar bridge, together with similar series condensers, are connected between the network terminals of the repeater and the balancing network.

When 135-cycle ringing is employed the balancing bridge includes a retardation coil and series condenser but the remainder of the ringing apparatus is not included. A shunt, resonant at 135 cycles, is also connected across the bridge points of the output transformer which reduces the gain of the repeater at 135 cycles an amount sufficient to prevent currents from circulating through the repeater and operating the 135-cycle relay on the wrong side of the repeater.

When 20-cycle ringing is employed, the balancing bridge consists simply of a cable pair the capacity of which is equal to the capacity of the pair connected to the line side of the repeater. Instead of connecting the end of this pair to a relay, as employed on the line side, it is left open, since the impedance of the relay is so high that its effect is negligible.

[fol. 15479] 1.3. Gain Characteristics.

When the potentiometer is on its top step the 1000-cycle gain is about 20.5 miles. For each step that the potentiometer is lowered the repeater gain is reduced two miles.

Drawing 906-283 shows typical gain frequency characteristics of this type of repeater. Three curves are shown, one with the potentiometer set on step 9 (top step), one with the potentiometer set on step 6 and one with the potentiometer set on step 3. It will be noted that the curve for step 6, which is about the average setting employed, is flatter than the curve for step 9.

The effect of the resonant shunt which, as previously mentioned, is employed in certain cases to improve the ringing, is indicated by a dotted curve for the condition when the potentiometer is set on step 9. It will be noted that the effect of the resonant shunt is to cause a reduction of the gain at low frequencies. The effect of this shunt does not vary materially with the setting of the potentiometer.

2. Description of Circuits and Equipment.

2.1. General Arrangement.

The general arrangement of the repeater equipment in offices where panel mounting is used is shown for a typical case on Drawing No. 192-B-11. With this arrange-

ment all the jacks for testing and patching the repeater sets, the testing equipment, a telephone set arranged for talking and monitoring on the repeater circuits, etc., are mounted on panels at the repeater rack along with the repeater sets in order to facilitate the maintenance of the circuits. The battery supply equipment for a large number of repeaters is grouped together on relay rack bays in general agree-
[fol. 15480] ment with the arrangement shown on Drawing No. 192-B-32. The balancing equipment, etc., is located on the composite coil racks in agreement with the present standard practice.

2.2. Repeaters and Associated Apparatus.

2.21. Repeater Sets.

The circuit of the repeater unit arranged for panel mounting is shown on Drawing No. 139-AX-30. This unit includes the apparatus necessary for the transmission circuit together with the local circuit relays necessary for transferring the signaling current around the repeater and the switching relays necessary for performing the proper functions when testing or when the attendant proceeds to talk or ring on the circuit. The signal receiving relays are located separately from the repeater unit so that either 20-cycle or 135-cycle ringing may be employed with only minor differences in the repeater unit. It will be noted that the circuit has been simplified somewhat by cutting out some of the features such as the "21" circuit test relays, means for monitoring east and west, and for operating relays in the repeater circuit which cut the repeater out when making gain measurements, etc., which were provided in the old standard repeater circuits but which are not required in connection with panel mounted installations used on cable circuits.

The apparatus of the repeater set is assembled on a panel as shown on Drawing No. 187-BX-5.

2.22. Line Circuits.

A typical arrangement of a through two-wire phantom group at a cable type telephone repeater station is shown in schematic form on Drawing No. 140-A-98. It will be noted on this drawing that jacks are provided at the primary test
[fol. 15481] board to permit testing the lines and for patching between the line circuits and the equipment as a whole

in case of line trouble, and at the repeater rack for testing and patching the repeater sets in case of repeater trouble. For cable installations it is not considered that the amount of trouble on equipment such as composite sets and phantom repeating coils will be sufficient to warrant the provision of jacks either at the test board or repeater rack to permit patching these units separately.

Repeater jack circuits are provided for each repeater set as shown on Drawing No. 191-B-100. The line and repeater line jacks are intended for patching between the lines and repeater sets. Network and repeater network jacks are also provided for patching the network circuit in case a repeater is used temporarily on a line which requires a network different from that which is normally associated with it. The provision of these jacks also facilitates making the balance tests mentioned in Section 3.5. Monitoring jacks are also provided for each repeater set. These jacks are wired as shown on Drawing No. 192-B-1.

The repeater set jacks and monitoring jacks together with the trunk jacks and other miscellaneous jacks, are located in a jack panel at the repeater rack as shown on Drawing No. 199-B-19. One jack panel is provided for each bay which should have sufficient capacity to care for the jacks of all the repeaters located within that bay.

2.3. Battery Supply Arrangements.

2.31. Power Supply.

In offices where a large number of telephone repeaters are employed, the labor involved in keeping the filament current constant is excessive unless means are provided so that fre-
[fol. 15482] quent adjustments in the individual filament circuits are not required. This may be done by splitting the central office battery and arranging the power plant equipment so that it is not necessary to charge either section of the battery while it is in use. A routine may then be followed under which it will be possible to regulate the battery voltage closely enough so that the variations in the filament current will not exceed the allowable limits. An automatic filament current regulating circuit is available for use in offices where close regulation of the battery voltage is not provided for.

Duplicate 130-volt batteries should be provided for supplying the space current since the repeaters described

herein are not arranged so that they can be used with a battery while it is being charged.

2.32. Battery Supply Circuits.

As it is expected that one of the above methods of controlling the filament current will be employed in offices where cable type repeaters are used, no means have been provided for inserting a rheostat in the filament circuits. Instead, small No. 18 and No. 19 type resistances are provided which are adjusted at the time of installation to compensate for differences in the resistance of the wiring in different circuits so as to obtain the proper filament current. After these resistances are once adjusted it will not be necessary to change them except to compensate for variations in the resistance of different vacuum tubes. Such adjustments will be necessary only when the resistance of the new tube is considerably above or below its normal value and will seldom be required.

[fol. 15483] The No. 101-D vacuum tubes described in Bulletin No. 68 "Nos. 101-D and 102-D Vacuum Tubes in Telephone Repeaters" operate on a lower filament current than the No. 101-B tubes which they replace. This, together with their slightly lower resistance makes it possible to operate four tubes in series from the 24-volt central office battery, which effects a very considerable saving in power consumption, especially in offices having a relatively large number of telephone repeaters.

The battery supply circuit for use where four tubes are operated in series is arranged as shown on Drawing No. 144-A-100. A key is provided in the filament circuit and in each of the plate circuits for measuring the currents. A battery cut off key is also provided for opening the filament circuit at times when the repeaters are not in operation. The alarm lamp for indicating an open filament is mounted in the base of key of the battery supply circuit with which it is associated.

The use of four tubes with their filaments in series requires that some care be taken in laying out the repeater equipment so as to prevent introducing unnecessary resistance in the wiring and cabling of the filament circuit and in no case should this resistance be allowed to exceed one ohm. In offices where duplicate batteries are not provided and where the voltage drops to 20 volts at the fuse board while the battery is being discharged, it may be necessary in a few

cases to select the tubes to be connected in series in order to prevent the current from dropping below the minimum during periods of low voltage. If duplicate batteries are pro- [fol. 15484] vided or if the battery voltage is always maintained above 21.0 volts at the fuse board selection of tubes should not be necessary in any case, provided the wiring resistance does not exceed one ohm.

In order to reduce the filament circuit resistance as much as possible, the windings of the No. 71-B retardation coil are connected in parallel and the filament alarm is obtained by means of a relay in the plate circuit of one of the tubes, instead of providing a relay in series with the filaments as was previously the practice.

In some special cases it may be desirable to connect only two tubes in series. In such cases the battery supply circuit is arranged as shown on Drawing No. 199-B-10.

In order to facilitate maintenance, the battery supply equipment is dissociated from the repeater sets and the apparatus for a large number of circuits located at a central point in general agreement with the arrangement shown on Drawing No. 192-B-32. A mounting plate as shown on Drawing No. 192-B-8 is provided for mounting the keys, one mounting plate caring for the keys of 10 battery supply circuits. The keys should be located at such a height as to be convenient to reach and so that it will be possible to read the meters when operating any of the keys.

2.33 Meter Circuits.

The voltmeter, ammeter and milammeter circuits provided for measuring the various currents and potentials are arranged as shown on Drawing No. 191-B-99. The ammeter and milammeter are wired to keys in the filament circuits and plate circuits so that the operation of a key associated with a given circuit connects the proper meter in series. [fol. 15485]. The "A" and "B" battery voltages are measured across the busbars instead of providing means for an individual measurement for each repeater set. The rheostat in series with the ammeter is for the purpose of adjusting the filament current when making tests for defective tubes.

It will be noted on Drawing No. 191-B-99 that apparatus may also be provided for adjusting the plate voltage to 130 volts when making tests on the vacuum tubes. This equipment will not ordinarily be required in cable type repeater

offices and may be omitted where the "B" battery voltage does not vary beyond the limits 125 volts to 135 volts, or wherever a repeater gain set is used for making these tests.

The meters are assembled on a panel as shown on Drawing No. 192-B-7. One set of meters should be provided for each three bays of battery supply equipment, the meters being located in the central bay about five feet above the floor. In offices where more than three bays are required for the battery supply equipment, it will be necessary to provide an additional set of meters.

Where both "22" type and four-wire repeaters are installed in the same office the same set of meters may be used for the two-wire and four-wire battery supply circuits. The two types of battery supply circuit may also be installed in the same bay if it is desirable to do so in order not to require the installation of an additional relay rack bay or an additional set of meters.

It is evident that any appreciable resistance in the ammeter leads will result in an incorrect measurement of the filament current. For this reason the resistance in the leads from the ammeter to the individual ammeter keys should not be allowed to exceed .12 ohm.

[fol. 15486] 2.34 Automatic Filament Current Regulating Circuit.

In offices where it is not economical or desirable to install duplicate 24-volt batteries the automatic filament current regulating circuit shown on Drawing No. 144-A-23 and described in Bulletin No. 65 "Automatic Filament Current Regulating Circuit," may be provided. With this arrangement the filament current can be kept within the required limits over the usual range of voltage of the 24-volt battery. Only one circuit of this kind need be provided in each office as it is capable of caring for about 400 filament circuits.

When the automatic filament current regulating circuit is used in offices where the battery supply equipment is located at a central point, the apparatus is located at the relay rack along with the rest of the battery supply equipment in general agreement with the arrangement shown on Drawing No. 196-B-30.

2.35 Alarm Circuits.

A no-voltage alarm circuit as shown on Drawing No. 185-B-79 should be provided in all offices where vacuum tube

repeaters are installed in order to provide an audible signal in case of failure of the telephone repeater "B" battery.

The auxiliary signal circuit for use in connection with the filament alarm is arranged as shown on Drawing No. 191-B-98.

2.4 Balancing Equipment.

The balancing equipment for use with cable type repeaters should be in accordance with the present standards. Drawings are attached covering the arrangement of the balancing equipment ordinarily required in cable offices. [fol. 15487] Drawing No. 144-A-30 covers the arrangement of the repeating coil groups employing balanced coils for use with "22" type repeaters. These coils are located at the composite coil rack as shown on Drawing No. 187-BX-90. In case phantom balancing sets (No. 51-A resistance) are required in the phantom circuit networks for balancing the non-inductive resistance in the side circuit repeating coils they should be connected between the drop windings of the repeating coil in the phantom circuit as indicated on Drawing No. 192-BX-5.

Where the two-wire circuits are composited for d. c. metallic telegraph, metallic composite balancing sets as shown on Drawing No. 193-B-99 are required. This equipment is located at the composite coil rack as shown on Drawing No. 196-B-57.

In cases where open wire lines enter the cable office and composite balancing sets are required for them the arrangements shown on Drawings Nos. 176-BX-3 or 180-BX-72 should be employed. The composite balancing equipment for open wire lines is located at the coil rack as shown on Drawing No. 172-BX-32.

The basic networks and building out sections are located at the coil rack in general agreement with the arrangement indicated in Fig. 1, Drawing No. 142-A-65.

In cable offices where jacks are not provided in the line circuit for the individual equipment units such as composite sets and phantom repeating coils, it is not considered necessary to provide jacks for the corresponding balancing equipment in the network circuits of the through line repeaters. In such cases the network circuits may be set up as indicated on Drawing No. 192-BX-6. Where jacks are desired for patching the individual equipment units in the

[fol. 15488] network circuit, the arrangement shown on Drawing No. 176-BX-1 may be used.

2.5 Testing Equipment.

2.51 Testing Circuits.

Either the 2-A repeater gain set described in Bulletin No. 27 which accompanied G. E. C. No. 1160-"A-" repeater Gain Set—Bulletin No. 27" or the receiver shunt circuit shown on Drawing No. 186-BX-99 may be used for testing repeater gains. The receiver shunt circuit is terminated in jacks at the repeater jack panel which are patched to the repeater line jacks east and west when it is desired to test the repeater circuit. The testing circuit jacks should be multipled in each relay rack repeater bay. This circuit is used in the same way as the testing circuit provided with the old standard repeaters except that when the repeater cutout key is thrown no relays are operated on the repeater set, the necessary switching functions being done by relays in the testing circuit. The testing circuit is assembled on a mounting plate as shown on Drawing No. 192-B-9.

2.52 Telephone Set.

The telephone set provided to permit talking and monitoring on the repeater circuit is arranged as shown on Drawing No. 192-B-2. This circuit is terminated on jacks in the repeater jack panel which are patched to the monitoring jacks of the repeater when it is desired to talk, monitor or ring on the repeater set. The telephone set jacks should appear in all of the repeater bays which the telephone set is intended to care for.

[fol. 15489] The telephone set together with the apparatus for the local ringdown trunk circuit mentioned below is assembled on a panel as shown on Drawing No. 192-B-10. In general, one telephone set should be provided for each three repeater bays.

2.53 Local Trunks.

Apparatus is provided with each telephone set for one local ringdown trunk circuit to the testboard. This circuit is arranged as shown on Drawing No. 192-B-3.

2.54 Interposition Trunks.

Interposition trunks are provided between the testboard and the repeater bays as shown on Drawing No. 192-B-4 to

permit patching between the testboard and repeater when desired. Where a full complement of interposition trunks is provided one-half of them should be multipled in the even numbered repeater bays and one-half in the odd numbered bays. The jacks at the repeater rack are located in the repeater jack panel shown on Drawing No. 199-B-19.

2.55 Miscellaneous Jacks.

Space for a number of miscellaneous jacks is provided in each of the repeater jack panels for miscellaneous circuits or for terminating spare networks or other miscellaneous equipment as required. Apparatus or circuits may be wired to these jacks as local conditions require.

2.6 Signaling Equipment.

The 20-cycle and 135-cycle signaling relay circuits associated with the repeaters are located separately from the repeater set and are wired as shown on Drawing No. 193-B-82. It will be noted that where 135-cycle signaling is employed the 135-cycle signal receiving circuit is connected [fol. 15490] across the line side of the output transformer and is balanced by a similar bridge across the network terminals. Also a shunt, resonant at 135-cycles, is connected across the bridge points of the output transformer in order to introduce a large loss in the repeater at 135-cycles and thus prevent false operation of the No. 150-Type relays where relatively large gains are required.

Where 20-cycle ringing is employed no relay is provided for balancing the No. 196-A relay, but a balancing cable pair equal in length to the relay leads should be provided in the same cable and left open at the position of the No. 196-A relay.

Two signaling relay circuits are required for each through line repeater. Two resonant shunts are required for each repeater arranged for 135-cycle ringing.

Where available the 135-cycle motor generator set should be used for supplying the signaling current to 135-cycle through line repeaters. The arrangement of the 135-cycle signaling leads for either 135-cycle generators or interrupters is shown on Drawing No. 187-B-4.

2.7 Cabling.

The cabling between the terminal strips at the top of the repeater bays and the distributing frame consists of

No. 19 gauge double silk and double cotton insulated lead covered cable. In general one cable is provided for each bay for the line and network circuits. Battery and generator leads are carried in a cable separate from the talking conductors in order to avoid noise induction.

[fol. 15491] The battery supply circuits should be cabled directly from the fuse board to the battery supply bay and then to the repeater set in order to avoid introducing unnecessary resistance in the filament circuit. No. 19 gauge conductors should be used for the "B" battery and signaling leads and No. 16 gauge conductors for the "A" battery leads. In order to permit connecting four tubes in series the total wiring resistance in the filament leads should be kept as low as practicable and in any case should not be allowed to exceed one ohm.

The local cables between the terminal strips at the top of the battery supply bays and the apparatus within the bay consists of a factory made form employing #20 B. B. E. wire for all conductors except the ammeter leads. The leads from the ammeter to the individual ammeter keys should be large enough so that the total resistance to the farthest key does not exceed .12 ohm.

3. Maintenance and Testing Requirements.

3.1. Precautions Against Magnetizing Coils.

Certain transformers and coils used in telephone repeater circuits are liable to be permanently injured in case direct current is allowed to flow through them. For this reason no source of direct current should be used in connection with a voltmeter, Wheatstone bridge, buzzer, or receiver in testing the repeater circuits. When it is necessary to trace out connections in the repeater wiring an alternating current of 800 or 1000 cycles should always be used and the tests made by bridging a receiver in series with a condenser across the circuit. A condenser should always be used in series with the receiver in order to prevent any pos-[fol. 15492] sibility of direct current being connected to the coils through the receiver.

An exception to the above is the test for continuity in the high winding of the input transformer which is required when the repeater is in trouble and the input transformer is suspected. In order to make this test, a portable voltmeter should be connected across terminals 1 and 3

of the repeater socket. A reading somewhat lower than the "C" battery potential should be obtained which will indicate the continuity of the input transformer winding. The high resistance of the voltmeter and transformer winding limits the direct current to a safe value.

3.2. Current and Potential Measurements.

The values of the filament current and plate potential are given in Bulletin No. 68 "—Use of Nos. 101-D and 102-D Vacuum Tubes in Telephone Repeaters". The normal space current is 8 mils. The filament current may be measured by operating the ammeter key, which connects the ammeter in series with the circuit. The plate voltage may be measured by operating the non-locking key B on the meter panel provided for that purpose. The space current may be measured by operating the mil-ammeter key in the battery supply circuit. When the key is thrown to the left the space current in the "east" tube is measured and when thrown to the right the current in the "west" tube is measured.

The normal value of the grid potential is 9 volts. The grid potential is measured by connecting a portable volt- [fol. 15493] meter across the terminals of the "C" battery. The "C" battery potential should not be allowed to drop below 8 volts.

3.3. Gain Tests.

As mentioned in division 1.3 above the normal gain for step 9 of the potentiometer when measured at 1000 cycles is 20.5 miles. With normal vacuum tubes, the gain should not deviate more than + 1 or — 2 miles from this unless the repeater is in trouble.

As the potentiometer setting is reduced the 1000-cycle gain should be reduced 2 ± 0.25 miles per step. The gain frequency characteristic of a normal repeater should not deviate more than ± 1 mile from the curves shown on Drawing 906-283 referred to in division 1.3 above. In making comparison of measured results on repeaters with the standard characteristics shown on the drawing, the gain at 1000 cycles should be made the standard of reference, comparisons being made in all cases of the differences between the gain at other frequencies and the gain at 1000 cycles. For example, in the case of the curve shown on Drawing 906-283 for step 6, the gain at 1700 cycles is 1.1

mile less than the 1000 cycle gain. For a repeater under test the 1700-cycle gain should fall between the limits 1.1 ± 1 mile from the 1000-cycle gain.

In order to insure successful operation it is very desirable that all repeaters of this type be fully checked up with respect to gain characteristics when the repeater is first installed and at such intervals as may be specified in standard instructions. For checking up the gain frequency [fol. 15494] characteristics it is usually sufficient to employ five frequencies only. For this type of repeater the frequencies suggested are 200, 500, 1000, 1700 and 2000 cycles.

In order to check up the condition of a repeater by means of single frequency measurements as above, the No. 2-A repeater gain sets as described in Bulletin No. 27, which accompanies G.E.C. No. 1160, will be found very suitable. The receiver shunt circuit shown on Drawing No. 186-BX-99 is not accurate enough for this purpose.

For very rough work it may sometimes be desired to use the receiver shunt circuit shown on Drawing No. 186-BX-99. The procedure for measuring the gain of a repeater with this receiver shunt circuit is as follows:

Patch the East "testing circuit jacks" to the "repeater line jacks east" and the West "testing circuit jacks" to the "repeater line jacks west" using three conductor cords. This causes relays in the repeater circuit to operate over the sleeve conductors of the patching cords, thus connecting test networks comprised of resistances to the repeater set in place of the regular networks.

Next set the potentiometer in the direction of transmission to the normal position with the potentiometer in the other direction at step zero.

The tone key is then thrown in the direction it is desired to test and the receiver shunt is adjusted until the same tone is heard with the repeater cutout key in either position.

The reading on the receiver shunt then indicates the gain of the repeater circuit. This reading cannot ordinarily be relied upon closer than ± 2 miles.

To test the repeater in the opposite direction the potentiomete settings should be reversed and the tone key thrown in the opposite direction.

[fol. 15495] 3.4. Tests on Vacuum Tubes.

Since the efficiency of vacuum tubes decreases after they have been in use for sometime it is necessary to make tests

at periodic intervals in order to insure that they are functioning properly and in order that tubes which are becoming defective may be replaced before they actually develop trouble in service. The method of making these tests with a No. 2-A Repeater Gain Set is described in Bulletin No. 27 which accompanied G.E.C. No. 1160.

Where a No. 2-A Repeater Gain Set is not available the tubes may be tested by means of the apparatus provided at the meter panel for this purpose. To make this test at the meter panel the ammeter key of the repeater circuit under test is operated and the current adjusted by means of the rheostat to the values specified. The space current is then measured by operating the mil-ammeter key. The condition of the tube is indicated by the variation in the space current for a given change in the filament current. The requirements which No. 101-D tubes should meet are set forth in Bulletin No. 68.

3.5. Balance Tests.

In order to insure proper operation of the repeater circuit it is necessary that the internal unbalances in the repeater be low. The improved "21" circuit No. 1 described in G.E.C. No. 891 "Telephone Repeaters—Improved 21 Circuit Test for Balance" provides a quick and simple means for determining the condition of balance. (Using method No. 1 it should be remembered that the true singing point is six miles greater than that indicated by the sum of the potentiometer settings.) When the "21" test [fol. 15496] is applied to two equal 1800 ohm resistances, the internal unbalances in a normal repeater of this type should be so low that a singing point of at least 40 miles will be indicated.

References:

G. E. C. No. 714	"Telephone Repeaters."
G. E. C. No. 891	"Telephone Repeaters,—Improved 21 Circuit Test for Balance."
G. E. C. No 1160	"No. 2-A Repeater Gain Set—Bulletin No. 27."
G. E. C. No. 1237	"Telephone Repeaters—Nos. 101-D and 102-D Vacuum Tubes."
Bulletin No. 65	"Automatic Filament Current Regulating Circuit."

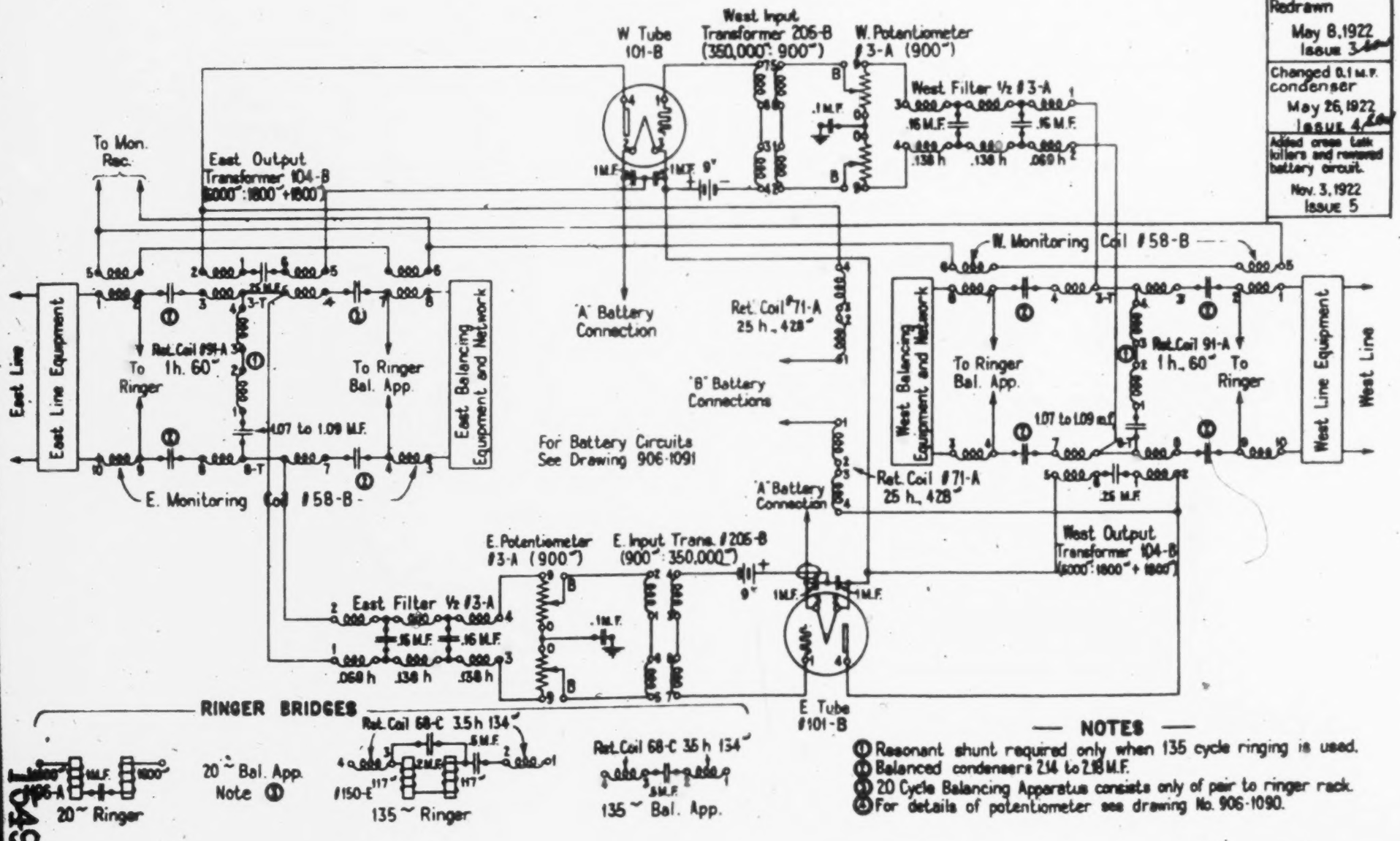
A.T.&T.CO. Dept. of Dev. & Res.

TRANSMISSION FEATURES OF READING TYPE

22 Type Telephone Repeater Circuit

906-278

Engineer
Draftsman
Checked by H.S.H.
Redrawn May 8, 1922 Issue 3
Changed 0.1 M.F. condenser May 26, 1922 Issue 4
Added cross talk killers and restored battery circuit. Nov. 3, 1922 Issue 5



NOTES

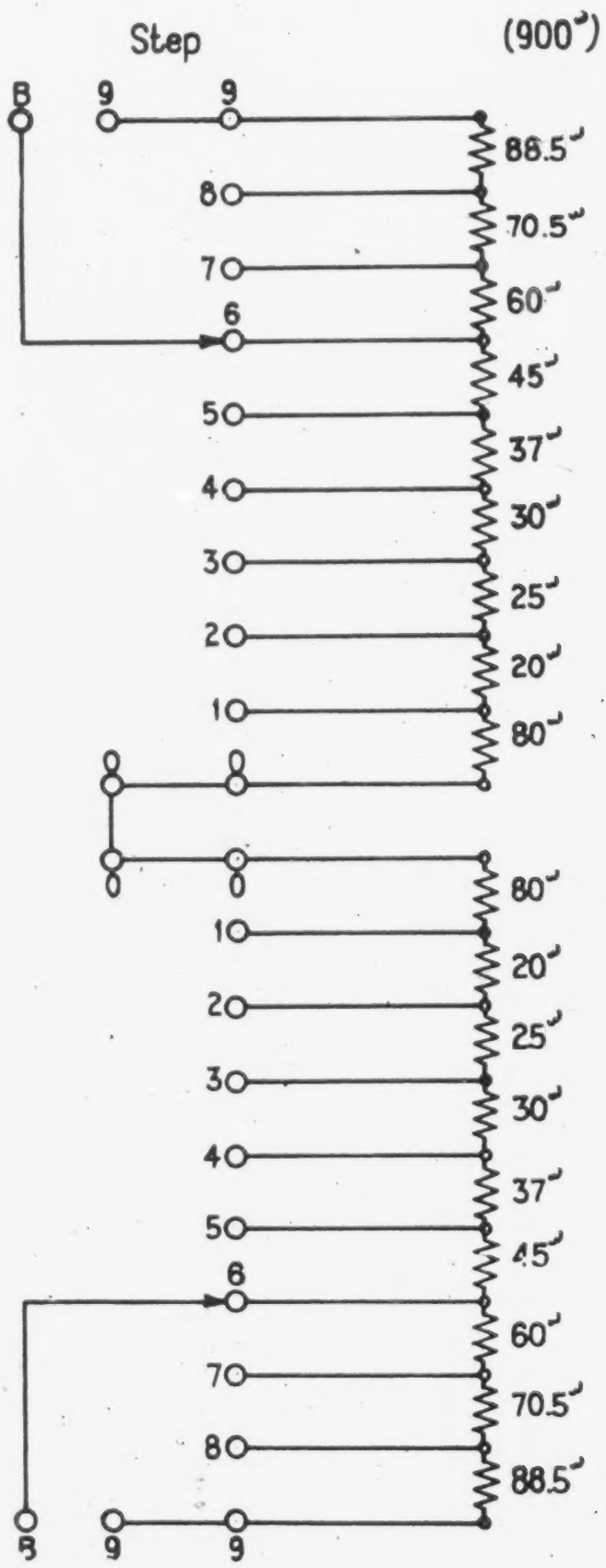
(1) Resonant shunt required only when 135 cycle ringing is used.
(2) Balanced condensers 2.14 to 2.18 M.F.
(3) 20 Cycle Balancing Apparatus consists only of pair to ringer rack.
(4) For details of potentiometer see drawing No. 906-1090.

10497

A.T.&T.CO.
Dept. of
Dev. & Res.

Diagram of #3-A Potentiometer for Reading Type Repeater

906-1090
Nov. 3, 1922



Resistances should be within ± 2% of nominal values.

15498

A.T.&T. CO
Dept. of
Dev. and Res.

TRANSMISSION DIAGRAM OF BATTERY SUPPLY
CIRCUITS FOR READING TYPE TELEPHONE REPEATER

908-1091

Engineer Legal
Draftsmen
Checked by

Nov. 3, 1922
Issue 1

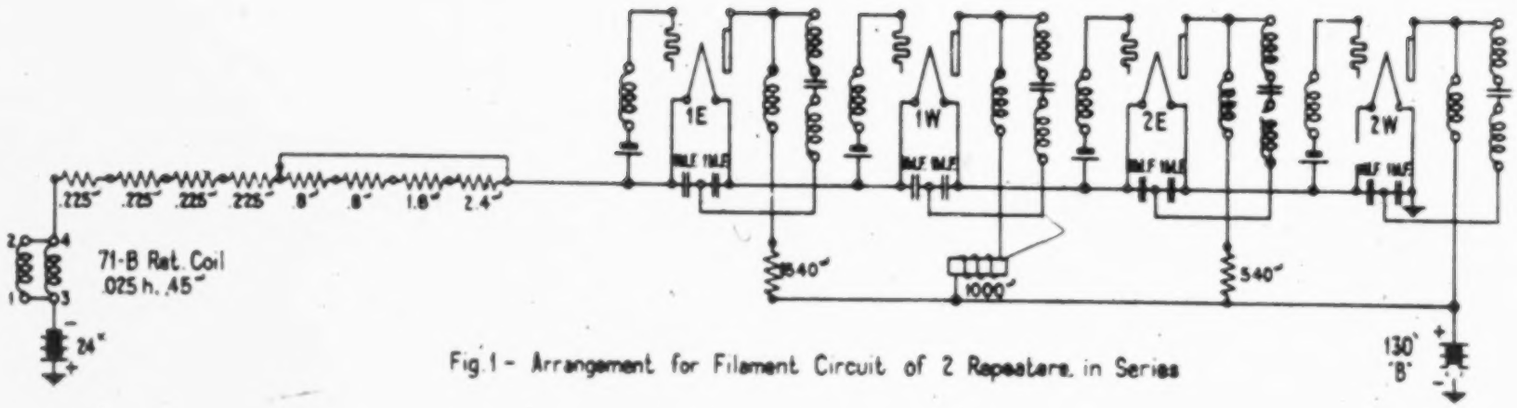


Fig. 1 - Arrangement for Filament Circuit of 2 Repeaters in Series

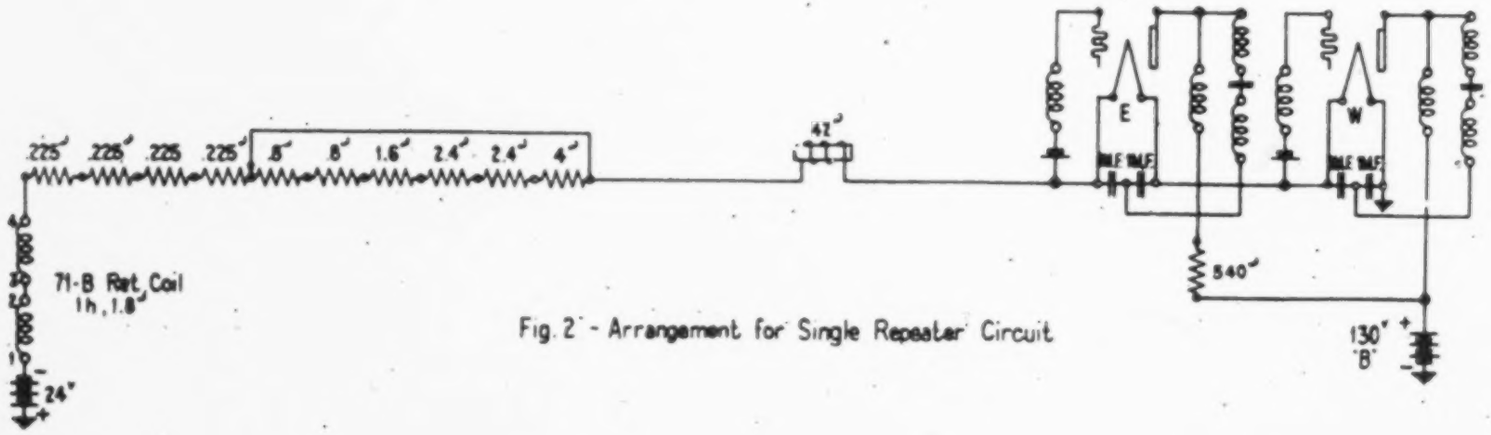
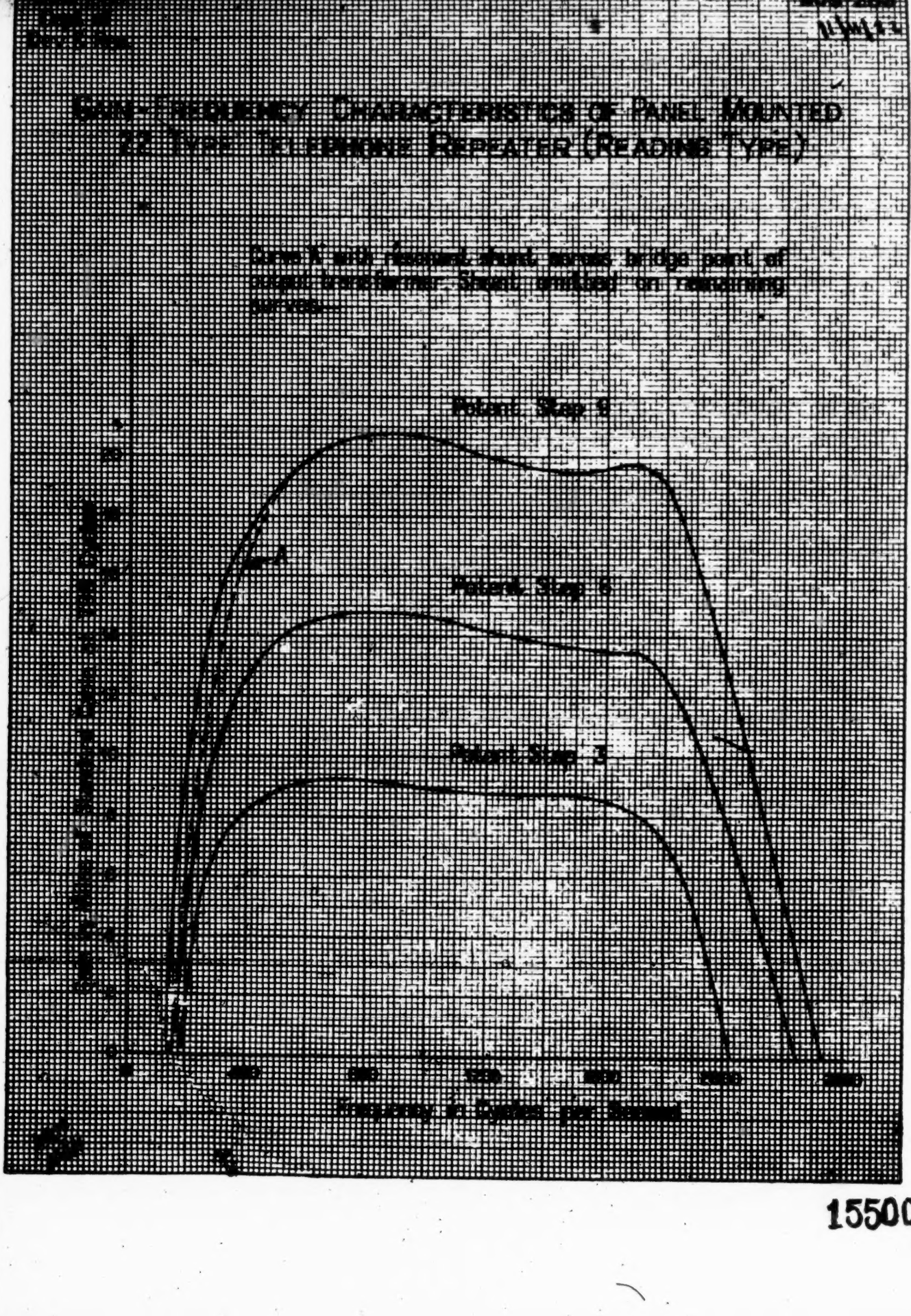


Fig. 2 - Arrangement for Single Repeater Circuit

15499


Drive A with resistance shunt across bridge point of output transformer. Shunt omitted on receiving set.
Point Step 9
Point Step 6
Point Step 3
Frequency in Cycles per Second

15500

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
"22" TYPE THROUGH LINE REPEATER
(Reading Type)
Arranged for 20-Cycle or 135-Cycle Ringing
Arranged for Relay Rack Mounting

Repeating Coil #58 B
E

To #150 E Relay for 135 Cycle Ringing
To #196 A Relay for 20 Cycle Ringing
See Drawing No 193 B 82 Fig 1 or 2

To Repeater Jack Circuit See Drawing No 191 B 100

#122 C F

2 MF H
#57 O
To 135~ Resonant Shunt for 135~ Ringing See 193-B-82 Fig 3

2 MF G
#57 O

Output Transformer #104 B
E

#57 O
2 MF E

½ #3 A High Freq Filter

#57 D
.1 MF

#3-A Potentiometer E

Input Transformer #205 BE

#57 B
1 MF

#100 A Socket

C Batt

#101-D Vacuum Tube.

Spl #12 D 129

3 #18 AE
Test Network

Note ①
#149 T or #149 per D 14161
A

#122 BD

#122 AM

#122 CF
D

Balancing pair to be wired through #196-A Relay Jack Box and left open at position of #196-A Relay for 20 cycle ringing. Cross connect to 150-E Relay balancing bridge for 135 Cycle ringing. See Dwg No 193-B-82 Fig 2

Battery Supply for all relays

#71 A

To Monitoring Jacks See Dwg No 192-3-1

#122 CB

#18 AF

#122 CF
A

#149 T or #149 per D 14161
B
Note ①

See Note ①

To 28~ or 135 ringing supply See Dwg No 187 B 4
Note ②

To Repeater Jack Circuit See Drawing No 191-B-100

To #196 A Relay for 20 Cycle Ringing
To #150 E Relay for 135 Cycle Ringing See Dwg No 193-B-82 Fig 1 or 2

#122 CF
C

#122 IF

C 2 MF

To 135~ Resonant Shunt for 135~ Ringing See 193-B-82 Fig 3

Output Transformer #104-B
W

#57 O
D 2 MF F

#57 U
A
2 MF

B

½ #3-A High Frequency Filter

#3-A Potentiometer W

Low
High
#57 C

#100 A Socket

C Batt

Input Transformer #205 B W

#101-D Vacuum Tube

Test Network
3 #18 AE

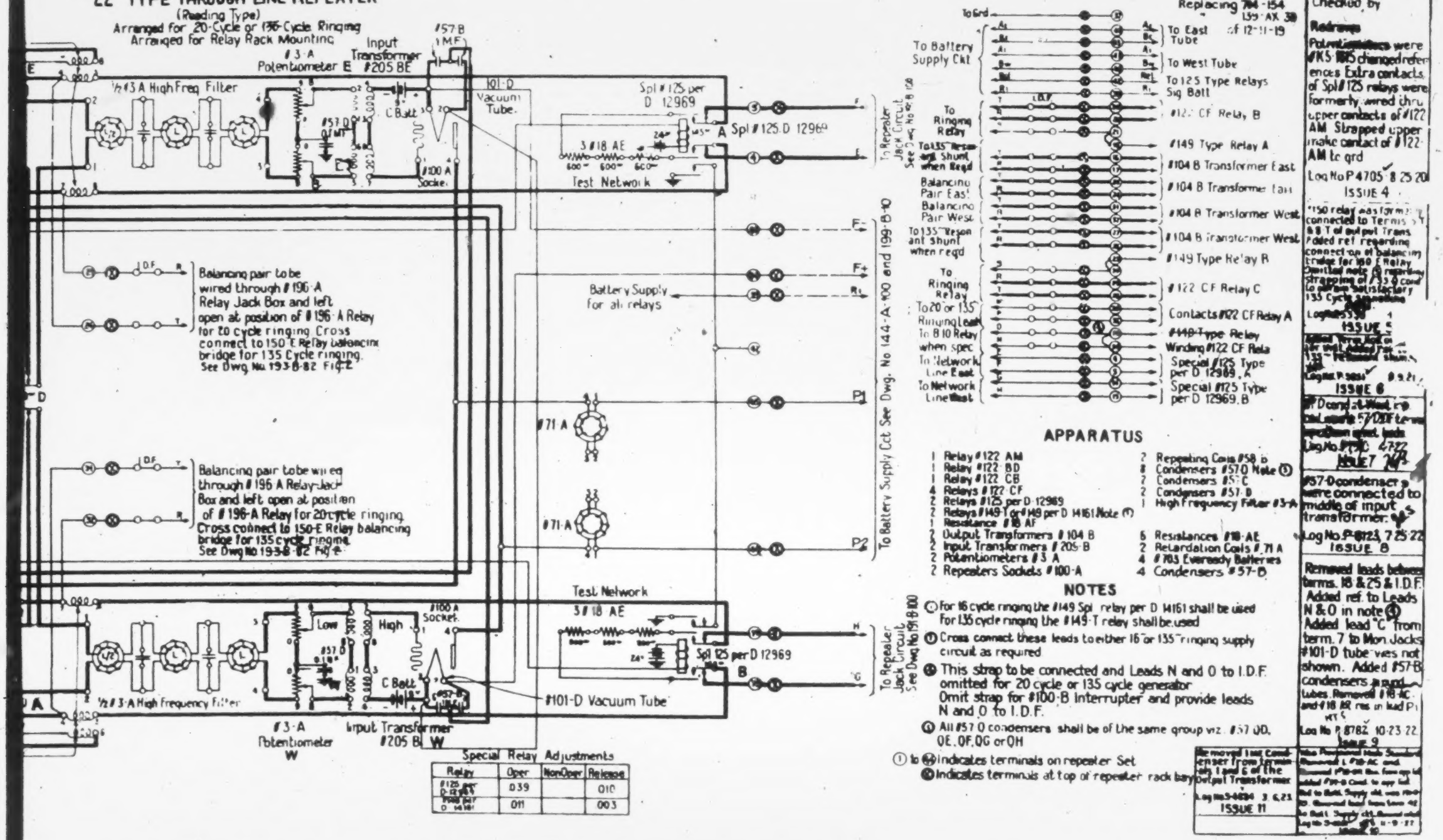
Repeating Coil #58-B
W

Special Relay Adjustments

Relay	Oper	Non-Oper	Release
#122 CF D	.039		.010
#149 T or D 14161	.011		.003

TELEPHONE REPEATER EQUIPMENT
"22" TYPE THROUGH LINE REPEATER

(Reading Type)
Arranged for 20-Cycle or 135-Cycle Ringing
Arranged for Relay Rack Mounting



Special Relay Adjustments

Relay	Oper	Non Oper	Release
#125 per D-12969	039		010
#149 per D-14161	011		003

139-AX-30
Standard
Replacing 704-154
139-AX-30

APPARATUS

1	Relay #122 AM	2	Repeating Coils #58 B
1	Relay #122 BD	8	Condensers #57 D Note (3)
1	Relay #122 CB	2	Condensers #57 C
4	Relays #122 CF	2	Condensers #57 B
2	Relays #125 per D-12969	1	High Frequency Filter #3-A
2	Relays #149-T or #149 per D 14161 Note (1)		
1	Resistance #18 AF		
2	Output Transformers #104 B	6	Resistances #18 AE
2	Input Transformers #205 B	2	Retardation Coils #71 A
2	Potentiometers #3 A	4	#763 Eveready Batteries
2	Repeaters Sockets #100 A	4	Condensers #57 D

NOTES

(1) For 16 cycle ringing the #149 Spl relay per D 14161 shall be used
For 135 cycle ringing the #149-T relay shall be used

(2) Cross connect these leads to either 16 or 135 ringing supply circuit as required

(3) This strap to be connected and Leads N and O to I.D.F. omitted for 20 cycle or 135 cycle generator
Omit strap for #100-B Interrupter and provide leads N and O to I.D.F.

(4) All #57 O condensers shall be of the same group viz. #57 OD, OE, OF, OG or OH

① to ⑯ Indicates terminals on repeater Set
Ⓐ to Ⓗ Indicates terminals at top of repeater rack bay

Engineer
Draftsman
Checked by

Redraws

Potentiometers were #K5-1805 changed references Extra contacts of Spl #125 relays were formerly wired thru upper contacts of #122 AM Strapped upper make contact of #122 AM to grd

Log No P 4705 8 25 20
ISSUE 4

#150 relay was formerly connected to Terminals 5 & 8 T of output Trans. Added ref regarding connection of balancing bridge for 150 E Relay Omitted note (3) regarding strapping of #135 O cond to obtain satisfactory 135 Cycle operation

Log No 5358 1
ISSUE 5

Log No P 5851 8 9 21
ISSUE 6

Log No P 6723 7 25 22
ISSUE 8

Removed leads between terms. 18 & 25 & I.D.F. Added ref to Leads N & O in note (3) Added lead "C" from term. 7 to Mon Jacks #101-D tube was not shown. Added #57-B condensers around tubes. Removed #18 AC and #18 BE res in lead P1

Log No P 8782 10-23 22
ISSUE 9

Removed lead Condenser from terminals 1 and 6 of the Output Transformer

Log No 5-0836 3 6 23
ISSUE 11

15501

TELEPHONE REPEATER EQUIPMENT

Through Two Wire Phantom Group
Arranged for Metallic Morse
Schematic Diagram

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

Basic Network
B.O Section
Composite Set
Composite Balancing Set
Phantom Composite Balancing Set
IDF
IMF
Repeating Coil
Line Jacks East
Repeater Line Jacks East
Net Jacks East
Rep Net Jacks East
Rep Line Jacks East
Rep Net Jacks West
Net Jacks West
Repeater Line Jacks West
Line Jacks West
Rep Line Jacks West
"22" Type Repeater
Line #1 East
Line #2 East
100Ω
#218
To Metallic Morse Line Jack or to Morse By-Pass cord
Primary Test Board
East Cable
Two Wire Repeater Rack

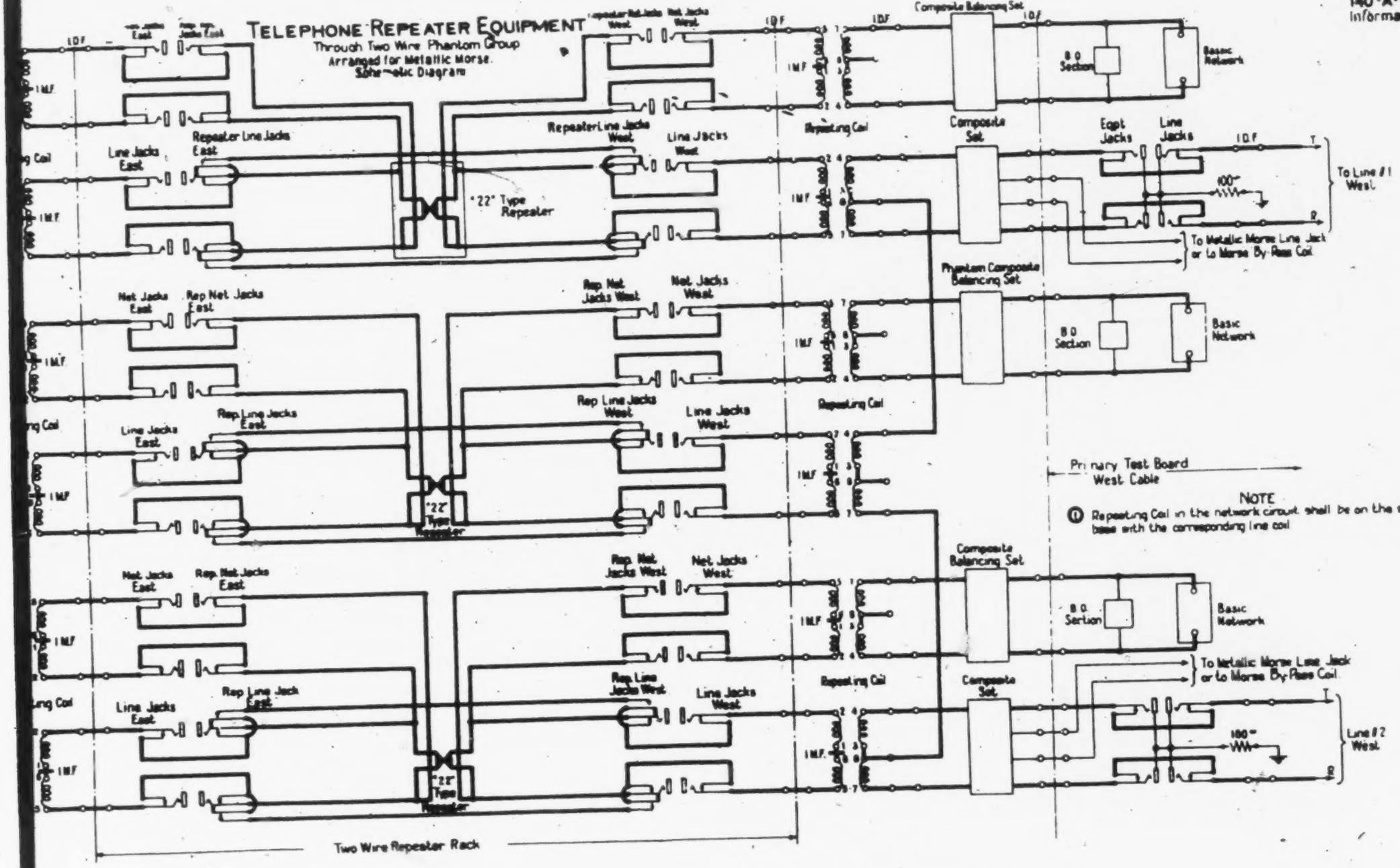
140-A-98
Information

Engineer Dr. Warren
Checked by
Log No P-705 8 5 20
Issue 1

Added Note
Log No 17591 [illegible]
[illegible]
Condensers in drop sides of coil were not shown.
Log No P-8827 11-1-22
ISSUE 3

TELEPHONE REPEATER EQUIPMENT

Through Two Wire Phantom Group
Arranged for Metallic Morse.
Schematic Diagram



TELEPHONE REPEATER EQUIPMENT

Automatic Filament Current Regulating Circuit

For Use in 24 Volt Offices

H6-A-23
Standard
Replacing 155-B-22

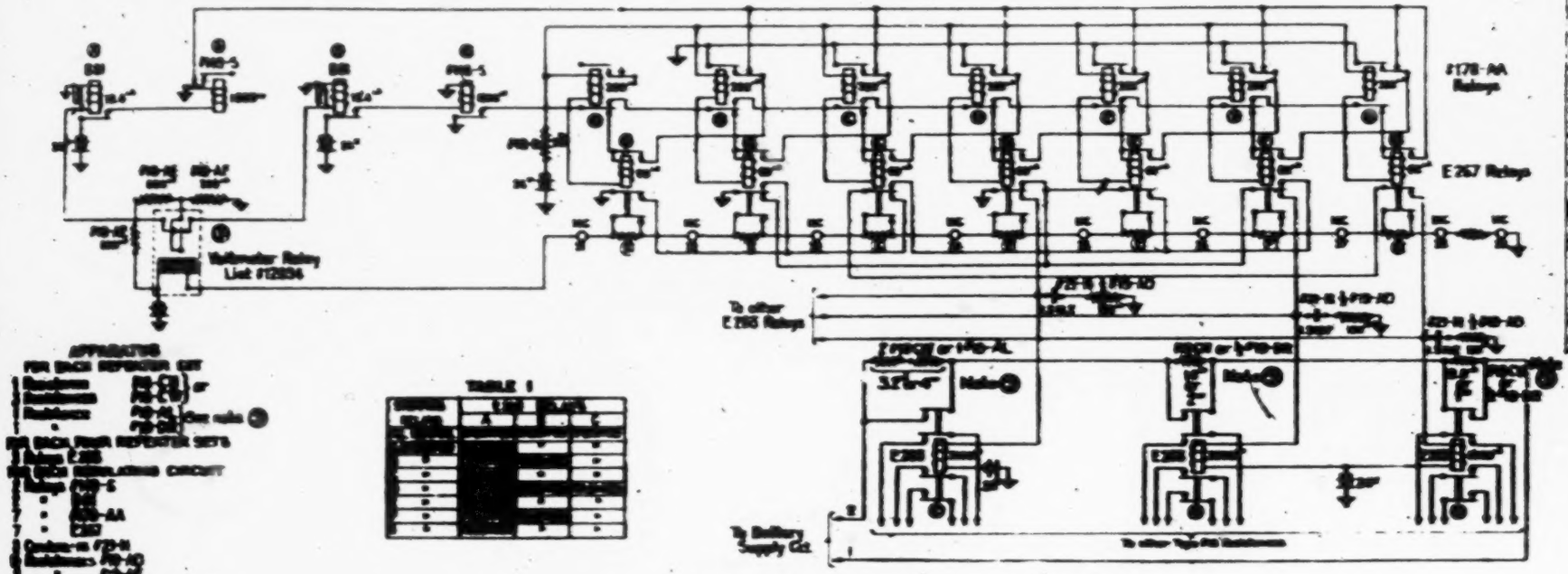


TABLE 1

-NOTES-

There shall be 3 leads each equipped with a 1 Ampere fuse from the 24-volt battery. One of these leads shall supply the voltmeter relay, one the master relays and one the E 265 relays.

Multiplier Resistance, furnished with voltmeter Relay F12834.
Increasing voltage moves the voltmeter relay pointer to right. Decreasing voltage moves the voltmeter relay pointer to left. All relays now shown in position for maximum voltage.

In offices where the filament current is maintained between the leads L2 and L3 inclusive the P19-CW and P19-CW resistances shall be used. In offices where the filament current is maintained between the leads S4 and S8 inclusive the P19-BW and P19-AL resistances shall be used.

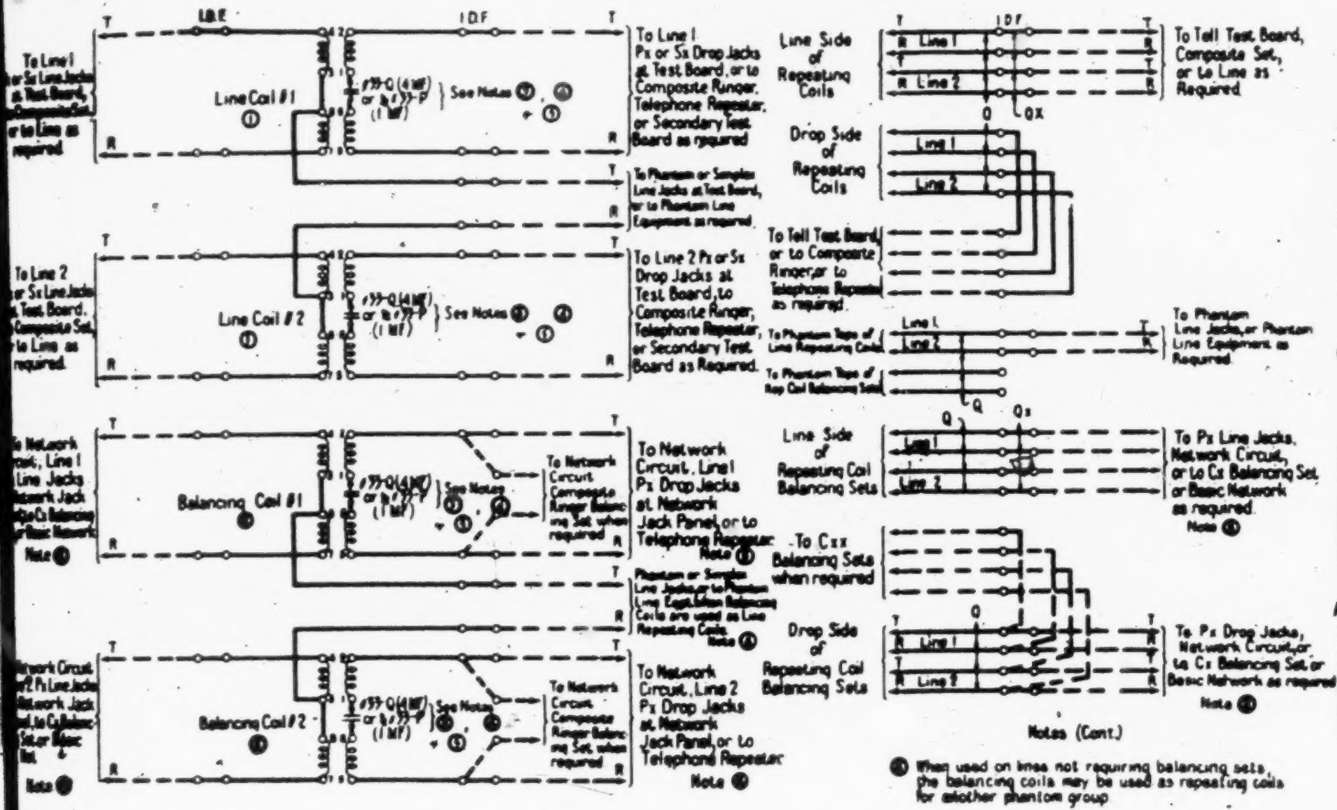
AMERICAN TELEPHONE & TELEGRAPH CO.
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT

REPEATING COIL GROUP

Employing Balanced Coils For use with Telephone Repeaters

144-A-30
Standard
Replacing ITE-BX-4



Notes (Cont.)

⑤ When used on lines not requiring balancing sets, the balancing coils may be used as repeating coils for another phantom group

- NOTES -

① Repeating Coils shall be as specified. The line coils shall be mounted on the same base with its balancing coil in the network circuit. The types of coils used are as shown in table I.

② Pairs marked "Q" in the cabling diagram are in duplex cable and pairs marked "Qx" are in duplex distributing frame wire. Each pair marked "Q" or "Qx" shall be in the same quad with the pair with which it would form a phantom.

③ Where repeating coil does not form shunt preventing proper operation of direct current supervisory relays in cords or trunks, the condensers shall be omitted except on circuits equipped with DC metallic telegraph.

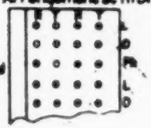
④ When repeating coils are used on small gauge cable circuits equipped for DC metallic telegraph, ½ #39 P (1 MF) condensers shall be used in all other cases where condensers are needed #39-Q (4 MF) condx. shall be used.

⑤ The same type of condenser shall be used in the line circuit and in the network. When 4 MF are required (see Note ④) the condenser shall preferably be #39-QD #39-QE, #39-QL or #39-QH, but #39-Q may be used.

TABLE I

COIL NO	IMPEDANCE RATIO			RESISTANCE	
75-A	1	TO	1	22Ω	21Ω
75-B	1	TO	1.62	14Ω	21Ω
75-C	1.62	TO	1	22Ω	13Ω
75-D	1	TO	2.62	8.5Ω	22Ω
75-E	2.62	TO	1	22Ω	8.5Ω

Terminal Strip Arrangement at HIDF



APPARATUS

2 Repeating Coils per Note ①
4 Condensers #39-Q or
2 Condensers #39-P per Notes ③ and ④

Engineer [illegible]
Draftsmen
Checked by
Log No. P 1545-4-7-22
ISSUE 1

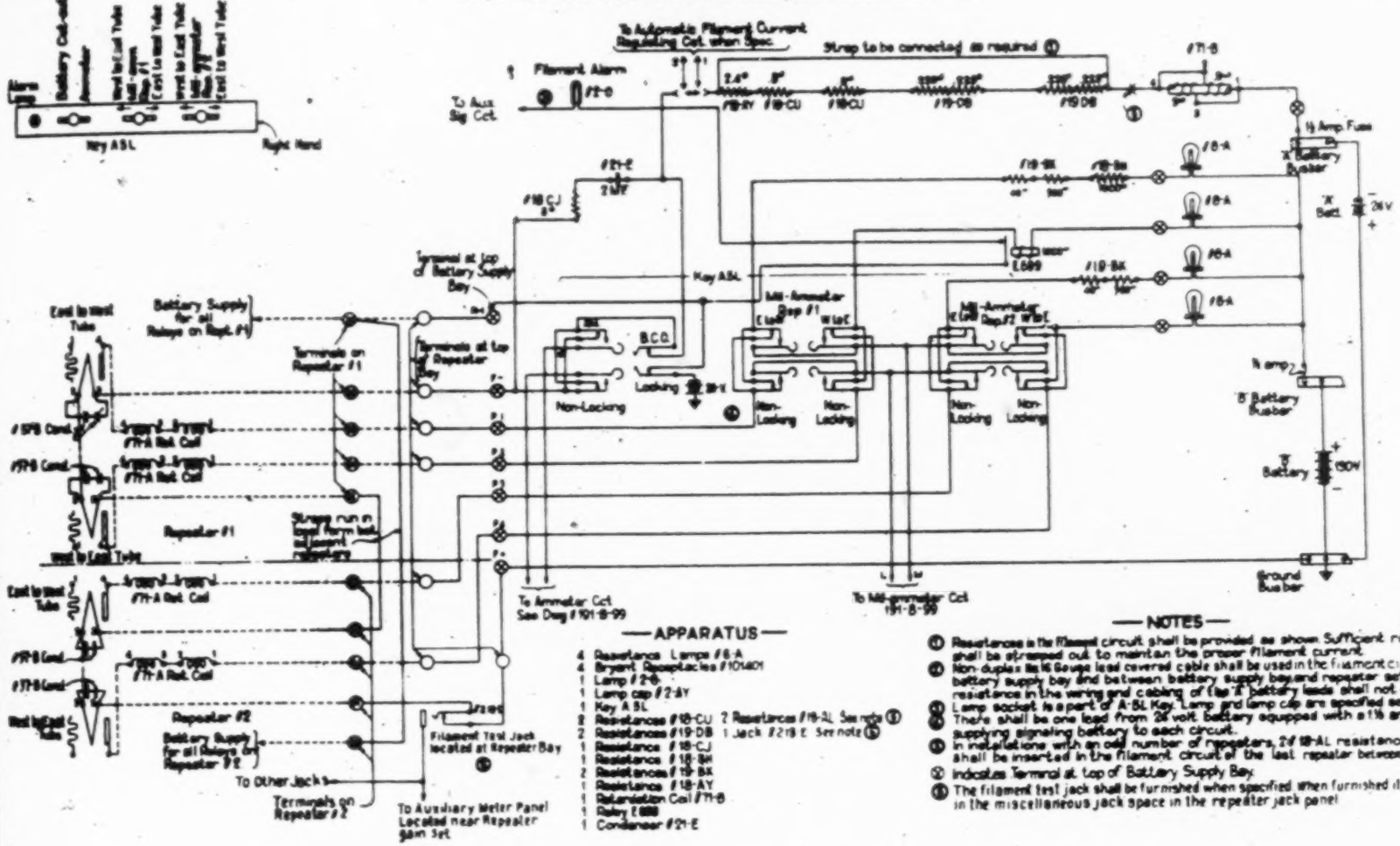
New Prov. Made, Stat. Replacing [illegible]
#39-P Cond. specified instead of #39-Q when 1 MF required. Changed order of notes and added note ⑤
Log No. 9-12896, 6-21-22
ISSUE 2

Log No. 5446h, 12-15-22
ISSUE 3

15504

Telephone Repeater Equipment
Battery Supply Circuit
For Reading Type 2-Wire Telephone Repeaters
For Offices where the Filament Circuits of 2 Repeaters are Connected in Series

144-A-100
Superseding
Replacing 1104 BICT
Partly Replacing 191-8-93



—APPARATUS—

4	Resistance Lamps #6-A
4	Bryant Receptacles #1014101
1	Lamp #2-B
1	Lamp cap #2-AY
1	Key A-BL
2	Resistances #18-CU 2 Resistances #19-BL See note (11)
2	Resistances #19-DB 1 Jack #2218-E See note (13)
1	Resistance #18-CJ
1	Resistance #18-BH
2	Resistances #19-BK
1	Resistance #18-AY
1	Retardation Coil #71-B
1	Relay #688
1	Condenser #21-E

—NOTES—

(1) Resistances in the filament circuit shall be provided as shown. Sufficient resistance shall be stranped out to maintain the proper filament current.
(2) Non-duplex No 16 Gauge lead covered cable shall be used in the filament circuit between the fuse board & the battery supply bay and between battery supply bay and repeater set. The total resistance in the wiring and cabling of the 'A' battery leads shall not exceed 1.0 Ohm
(3) Lamp socket is a part of A-BL Key. Lamp and lamp cap are specified separately
(4) There shall be one lead from 26 volt battery equipped with a 1½ ampere fuse for supplying signaling battery to each circuit.
(11) In installations with an odd number of repeaters, 2 of 18-AL resistances (4" each) shall be inserted in the filament circuit of the last repeater between the #19-DB Res. and #71-B Coil
(12) Indicates Terminal at top of Battery Supply Bay.
(13) The filament test jack shall be furnished when specified. When furnished it shall be located in the miscellaneous jack space in the repeater jack panel

Issue 1
Issue 2
Issue 3
Issue 4

15505

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

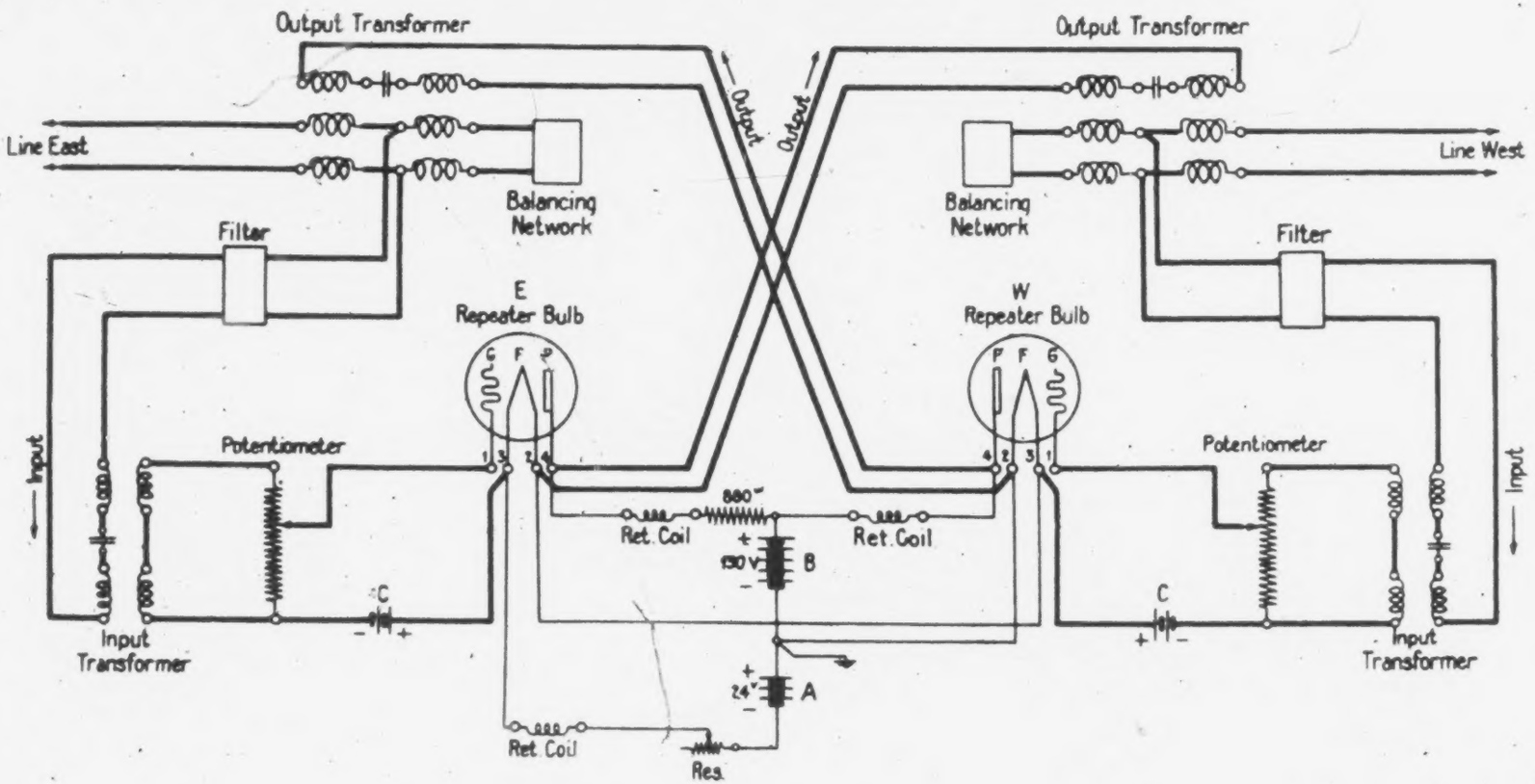
TELEPHONE REPEATER EQUIPMENT

Simplified Diagram of a "22" Type Telephone Repeater Circuit for Vacuum Tube Repeaters.

172-B-40
Standard
Replacing 172-BX-40
of Oct. 17, 1919.

Engineer
Draftsman
Checked by
Redrawn.
Log No. S-1881. 3-22-20
ISSUE 7

Title Changed.
Log No. S-4301 11-16-22
ISSUE 8



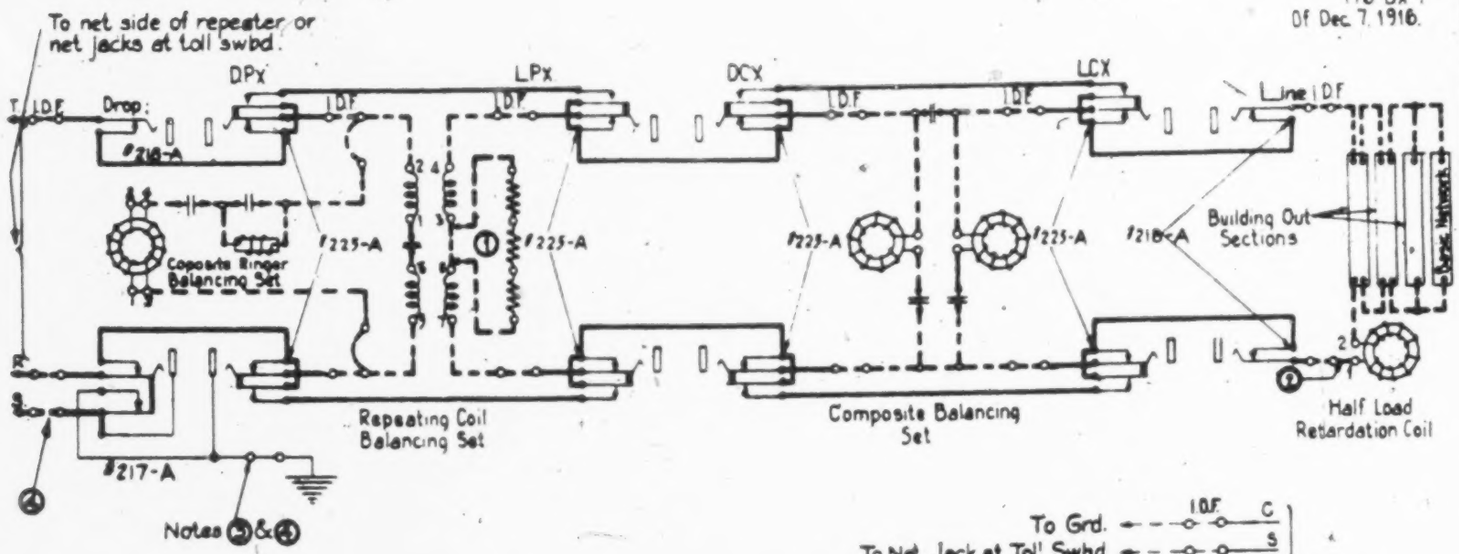
15506

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
NETWORK JACK CIRCUIT

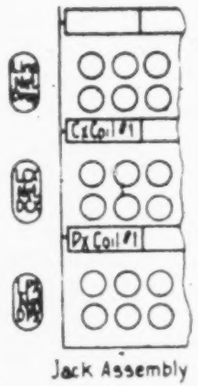
176-B-1
Standard
Replacing 128-A-30
128-A-31
133-A-31
176-BX-1
Of Dec. 7, 1916.

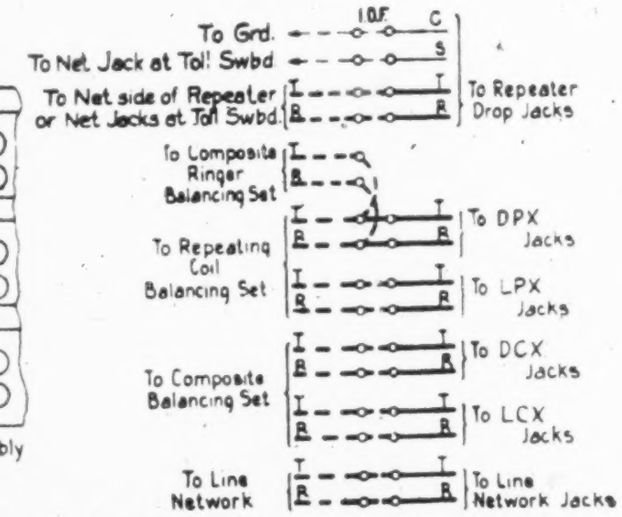
Engineer	M.L.C.
Draftsman	
Checked by	
Redrawn	
Log No. S-3538	5.5.22
ISSUE 3	
Added Notes ① and ⑤	
Log No. S-3609	6.16.22
ISSUE 4	
Changed jack designations, added notes 3, 4 and 5. Used #217-A jack instead of #218-A jack.	
Log No. S-4114	9.26.22
ISSUE 5	



-Apparatus-

3 Jacks #218-A
8 Jacks #225-A
④ 1 Jack #217-A





—NOTES—

The Composite Ringer Balancing Set, Repeating Coil Balancing Set, Composite Balancing Set, Building out Sections, Basic Network and Half Load Retardation Coil shall be furnished as specified

① When this network is used to balance a phantom circuit with composited side circuits which requires a resistance for balancing the resistance of the repeating coils on the side circuits, the #51-A resistance shall be connected between terminals 3 and 8 of the repeating coil balancing set.

② When this net work circuit is used to balance a composited phantom circuit which requires a resistance for balancing the resistance of the repeating coils on the side circuits, the #51-A resistance shall be connected in series with the line network.

⑤ The sleeve lead shall be connected to ground as shown for those lines which are not equipped with composite ringers or which require composite ringer balancing sets different from those associated with the cord circuit repeater.

④ In offices where cord circuit repeaters are not used or where relays are not provided in the network sleeve of the cord circuit repeater, the sleeve leads to the repeater drop and DPX jacks may be omitted and a #218-A jack used instead of a #217-A jack.

⑤ The cabling from the I.D.F. to the jacks should approximate in length that of the line cables of the test board.

15507

American Telephone & Telegraph Co.
Department of
Development & Research

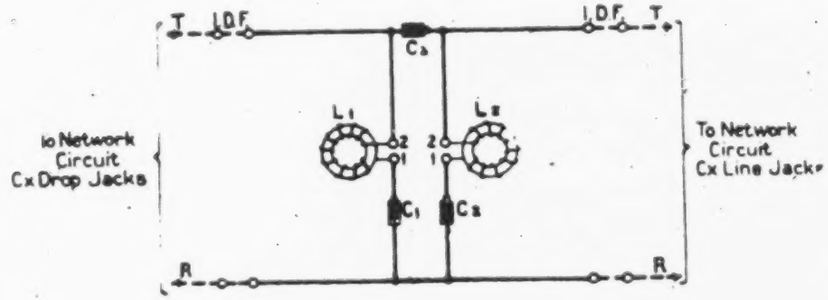
TELEPHONE REPEATER EQUIPMENT
COMPOSITE BALANCING SET.

176-B -3
Standard

ISSUE 2
Added D-Spec Application
Mod. Right and Dec 3, 1946

ISSUE 3
Res of #44-H was 175
" #44-G " 75
Log No 17716 7-26-17

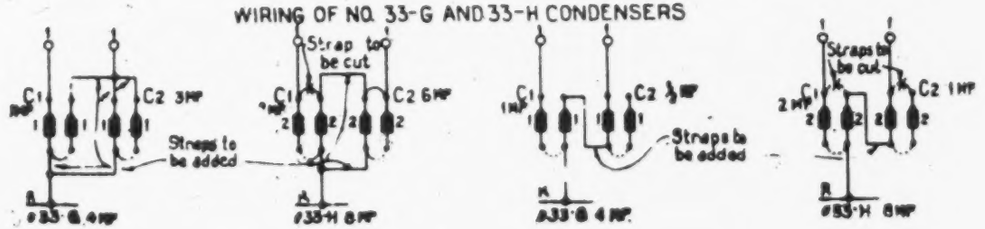
ISSUE 4



—APPARATUS—

	TERMINATING PHYSICA OR PHANTOM LINES COMPOSITED.	TERMINATING PHANTOM LINES WITH SIDE CIRCUITS COMPOSITED	TERMINATING PHYSICAL OR PHANTOM LINES WITH INTERMEDIATE COMPOSITES	TERMINATING PHANTOMS WITH INTERMEDIATE COMPOSITES ON SIDE CIRCUITS.
Coils	L1 285 ~ / L2 285 ~ } #44-H	L1 115 ~ / L2 115 ~ } #44-G	L1 285 ~ / L2 285 ~ } #44-H	L1 115 ~ / L2 115 ~ } #44-G
Condensers	C1 1 MF. / C2 3 MF. } #33-G	C1 2 MF. / C2 6 MF. } #33-H	C1 1 MF. / C2 ½ MF. } #33-G	C1 2 MF. / C2 1 MF. } #33-H
	C3 1 MF. #33 per D-10454.	C3 2 MF. #33 per D-10460	C3 1 MF. #33 per D-10454	C3 2 MF. #33 per D-10460

WIRING OF NO. 33-G AND 33-H CONDENSERS



15508

American Telephone & Telegraph Co
Department of
Development & Research

TELEPHONE REPEATER EQUIPMENT
COMPOSITE BALANCING SET.

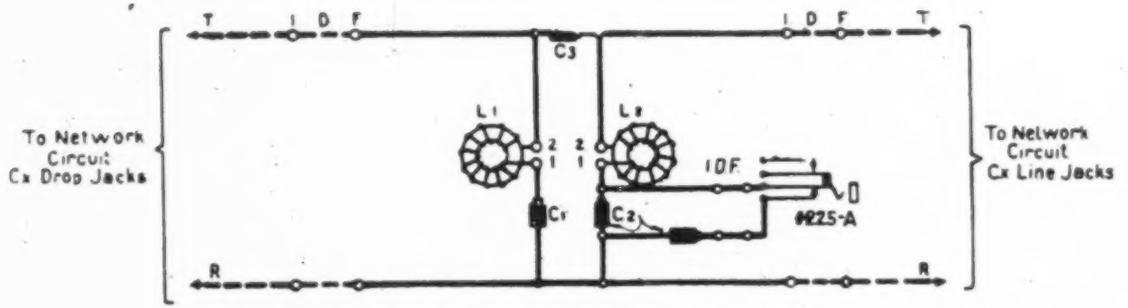
Arranged to change from terminal to intermediate or from intermediate to Terminal balancing set

180-B-72
Standard

Engineer [illegible]
Draftsman [illegible]
Checked by [illegible]
Made Standard 1-3-[illegible]
Log No. 7353 6-25-[illegible]

Issued [illegible]
Wire standard [illegible] to leads to Jack [illegible] notes regarding [illegible] ing the sets [illegible]
Logged 190.78 Jan 3 1918

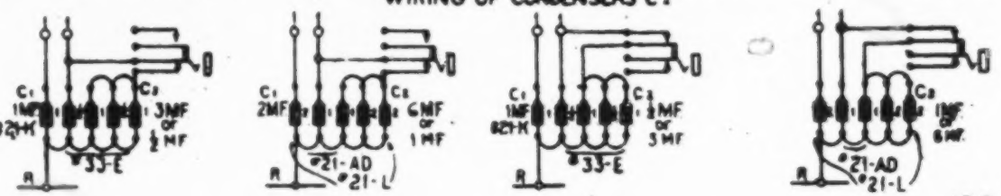
ISSUE 2 3-[illegible]
#225-A Jack [illegible] #215
Log No. S-4053. [illegible] 14-22
ISSUE 3



APPARATUS

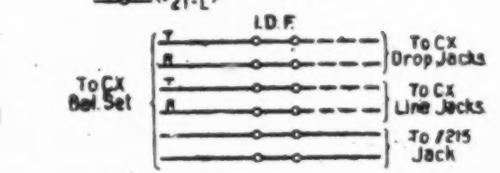
	Normally Terminal Set Convert to Intermediate		Normally Intermediate Set Convert to Terminal	
	TERMINATING PHYSICAL OR PHANTOM LINES COMPOSITED	TERMINATING PHANTOMS LINES WITH SIDE CIRCUITS COMPOSITED.	TERMINATING PHYSICAL OR PHANTOM LINES WITH INTERMEDIATE COMPOSITES	TERMINATING PHANTOMS WITH INTERMEDIATE COMPOSITES ON SIDE CIRCUITS.
Coils	L1 285 ~ L2 285 ~ 1 #44-H	L1 118 ~ L2 118 ~ 1 #44-G	L1 285 ~ L2 285 ~ 1 #44-H	L1 118 ~ L2 118 ~ 1 #44-G
Condensers	C1 1MF 1 #21-K; C2 3MF 1 #33-E	C1 2MF 1 #21-AD; C2 6MF 3 #21-L	C1 1MF 1 #21-K; C2 3MF 1 #33-E	C1 2MF 1 #21-AD; C2 1MF 3 #21-L
	C3 1MF #33 per D-10454. 1 Jack #225-A	C3 2MF #33 per D-10460. 1 Jack #225-A	C3 1MF #33 per D-10454. 1 Jack #225-A	C3 2MF #33 per D-10460. 1 Jack #225-A

WIRING OF CONDENSERS C2



NOTES

The #225 Jack shall be mounted at the test board or in the net work jack panel as specified.



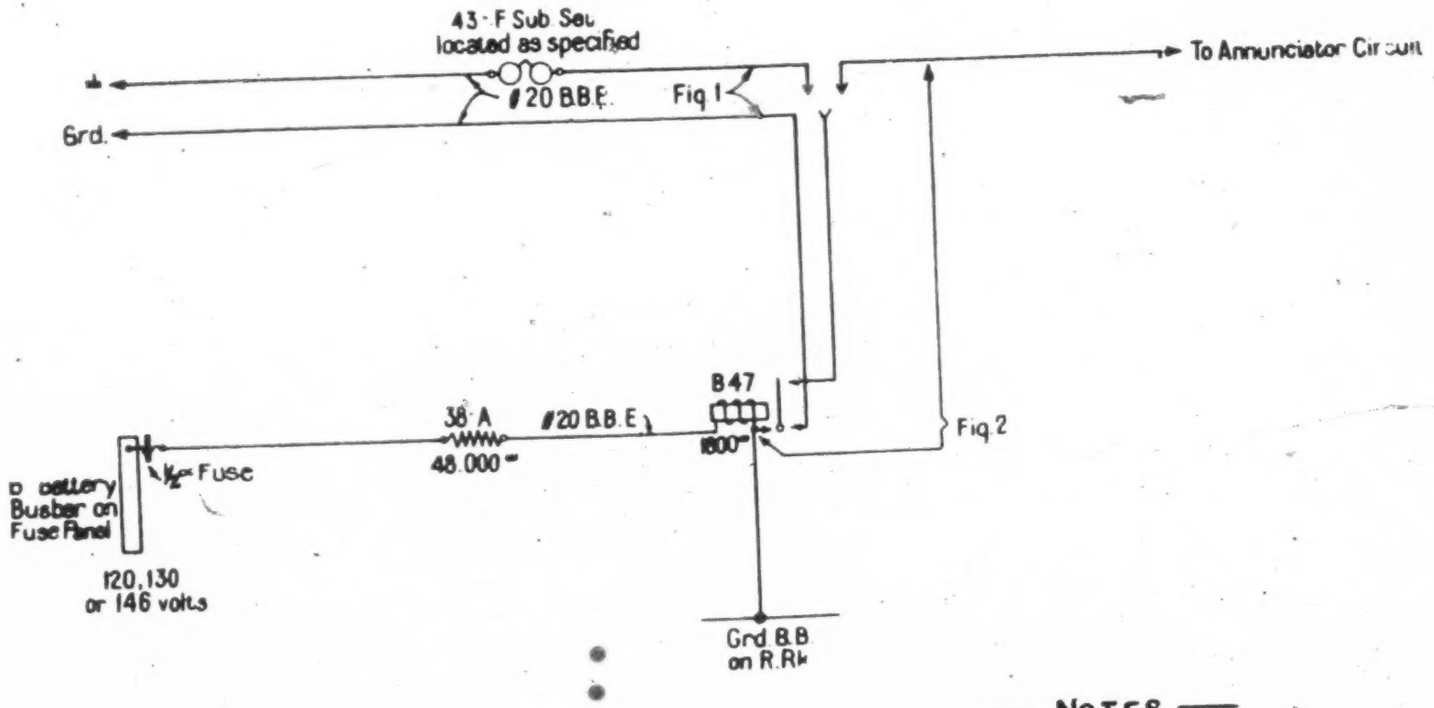
15509

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

POWER EQUIPMENT
NO-VOLTAGE ALARM CIRCUIT
For Telephone Repeater "B" Battery

185-B-79
Standard
Replacing 705-118
Replacing 185-B-79
of 11-9-18

Engrossed by [illegible]
Drafting [illegible]
Checked by [illegible]
Redrawn on account of condition of tracing
Log No S-2585, 5-8-21.
ISSUE 3



APPARATUS

1 Relay B 47 (638-A Mtg. Plate if not on R. Rk.)
1 Resistance # 38-A
1 Fuse #35-F
1 Subscribers Set #43-F with distinctively toned gongs as specified

NOTES

1. Fig. 1 shall be used when separate alarm bells are specified
2. Fig. 2 shall be used when an annunciator system is specified
3. This circuit to be used with all installations of vacuum bulb type telephone repeater equipment using storage cells for "B" battery.

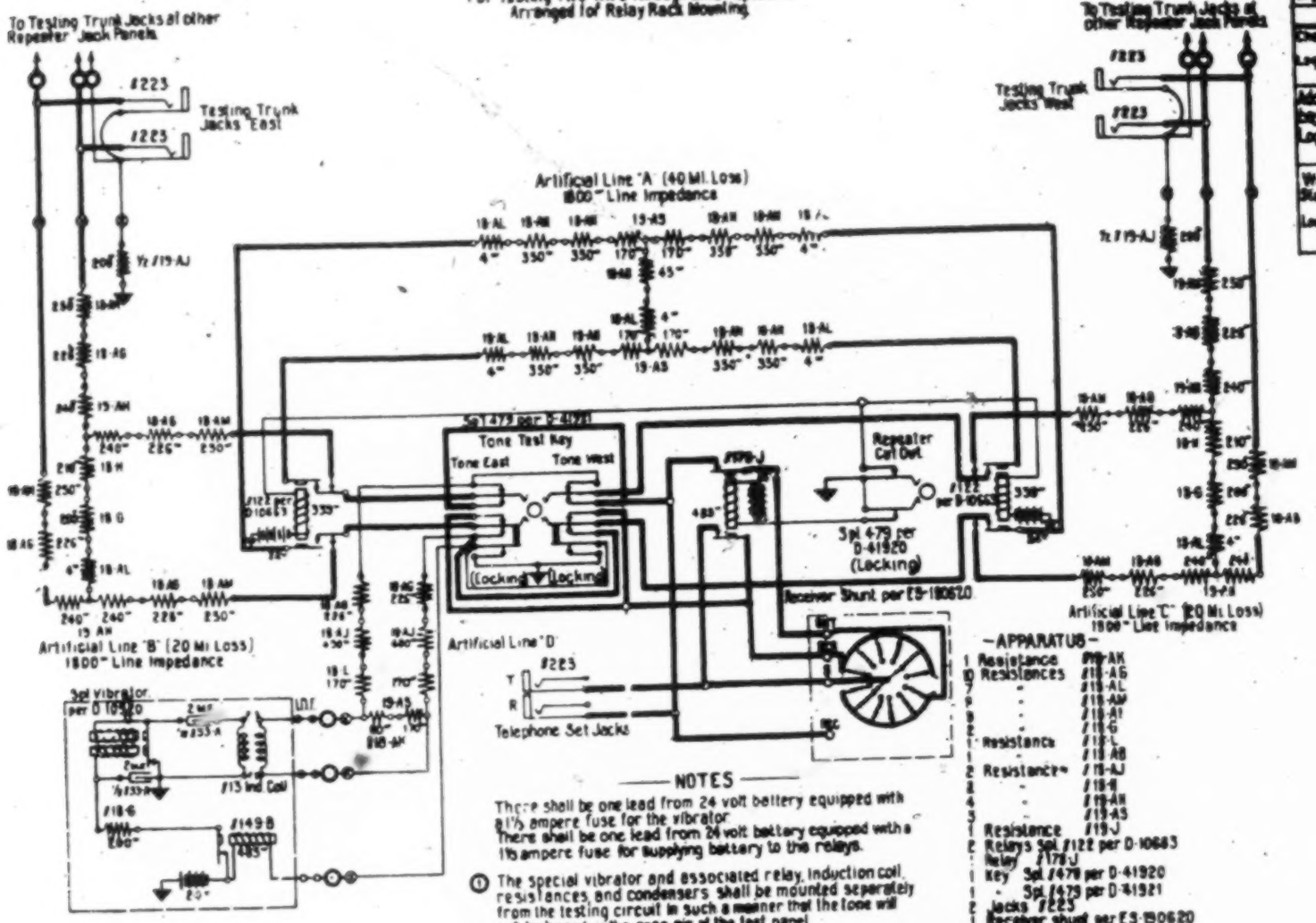
15510

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
TESTING CIRCUIT

For Testing Two Wire Through Line Repeaters
Arranged for Relay Rack Mounting

156-BX-99
Standard
Replacing 704-1-80.



NOTES

There shall be one lead from 24 volt battery equipped with a ½ ampere fuse for the vibrator.
There shall be one lead from 24 volt battery equipped with a ½ ampere fuse for supplying battery to the relays.

① The special vibrator and associated relay, induction coil, resistances, and condensers shall be mounted separately from the testing circuit in such a manner that the tone will not be heard in the open air at the test panel.

⊗ Indicates terminal on testing circuit panel

○ Indicates terminal at top of bay

—APPARATUS—

1	Resistance	#19-AK
10	Resistances	#19-AG
7	"	#19-AL
9	"	#19-AM
8	"	#19-AJ
2	"	#19-G
1	Resistance	#19-L
1	"	#19-AB
2	Resistances	#19-AJ
8	"	#19-H
4	"	#19-AH
5	"	#19-AS
1	Resistance	#19-J
2	Relays Spl #122 per D-10683	
1	Relay #178-J	
1	Key Spl #479 per D-41920	
1	" Spl #479 per D-41921	
2	Jacks #223	
1	Receiver shunt per ES-190620	
1	Relay #149-D	
1	Resistance #196	
1	Condenser #334	
1	Induction coil #13	
1	Vibrator Spl per D-10520	

For Each Repeater Rack Bay
4 Jacks #223

Engineer [illegible]
Drafting Room [illegible]
Checked by
Log No. P726 1-19-48
ISSUE 1
Changed Register Block
Log No. [illegible]
135 Sht. 2
Added Terminals at top of bay 208
Log No. 27907 4722
1948 ISSUE 3
Web Provisional Made Standard.
Log No. 9-4307-11-1-22
ISSUE 4.

15511

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
WIRING OF 135 CYCLE RINGING LEADS

For Use with Two Wire Through Line Repeaters
Arranged for Relay Rack Mounting

187-B-4
Standard
Replacing 704-232

Engineer
Draftsman
Checked by
Made Standard 11-7-22
Log No. P-758 +80-18

ISSUE 1
#19-G resistances were changed to #19-AJ
Log No. P 3135 12.1.1939

ISSUE 2
Added #18-BH Res. and note (12)
Log No. P 3394 6.8.21

ISSUE 3
#74-G Heat Coils were changed to 1/4 amp fuses
Log No. 27546 4-7-22

ISSUE 4
Was Prov. Made Standard. Wiring for interrupters and generators not shown on seperate figs. Removed Note (1)
Log No. S-4520 11-7-22

ISSUE 5

FIG. 1
For Offices Employing Interrupters

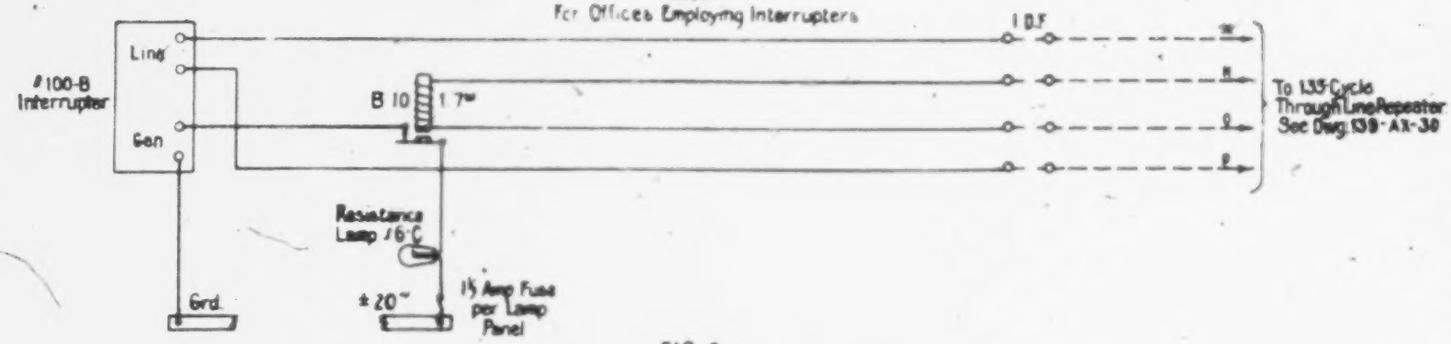
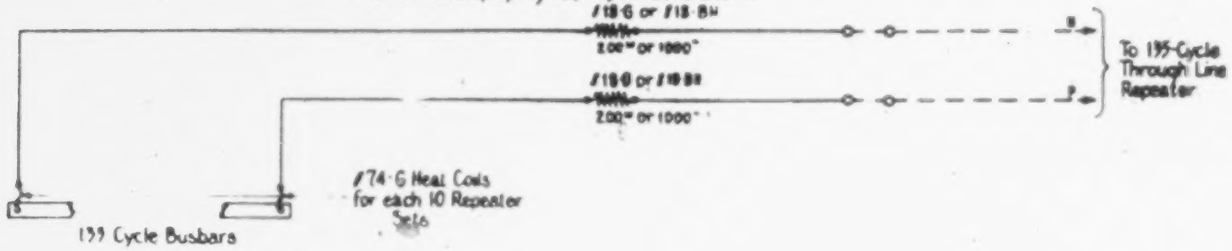


FIG. 2
For Offices Employing 135-Cycle Generators



APPARATUS

— For Offices Employing Interrupters —

1 Relay B-10 for each Repeater Set
1 Interrupter #100-B
1 Resistance Lamp #6-C } For each 3 Repeater Sets
1 Bryant Receptacle #101401

— For Offices Employing 135 Cycle Generators —

2 Resistances #19-G or #18-BH for each Repeater Set (12)

NOTE

(12) No 18 BH resistances (1000 ohms) shall be used for ringing leads to repeaters when used on circuits which are compolsited for metallic telegraph

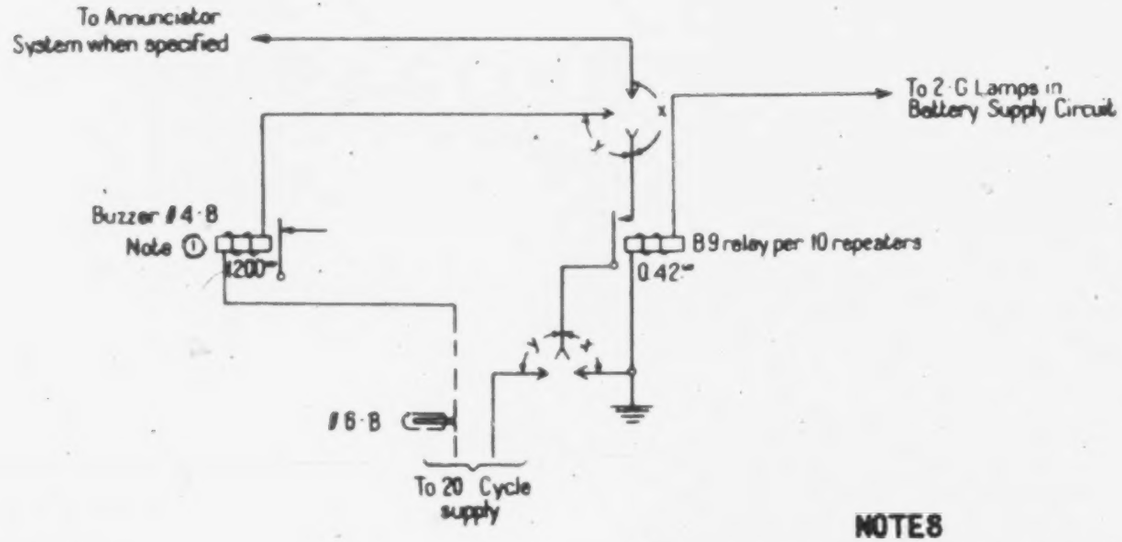
15512

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
AUXILIARY SIGNAL CIRCUIT
For telephone Repeater Filament Alarm Signals
Arranged for relay rack mounting

191-B-88
Standard

Engineer
Draftsmen
Checked by
Log. No. P-4721-8-25-20
Issue 1
Was Provisional
Made Standard
Log No. S-4270 10-30-22
ISSUE 2



APPARATUS

1 Relay B9 for each 10 repeater sets
1 Buzzer #4-B for each 3 battery supply bays

NOTES

① When an annunciator system is used for the filament alarm signals omit the #4-B buzzer and use 'X' wiring. When the annunciator system is not required use 'y' wiring.
② There shall be one B9 relay for each 10 repeater sets
③ B9 relays and buzzer shall be located at the relay rack with the battery supply equipment

15513

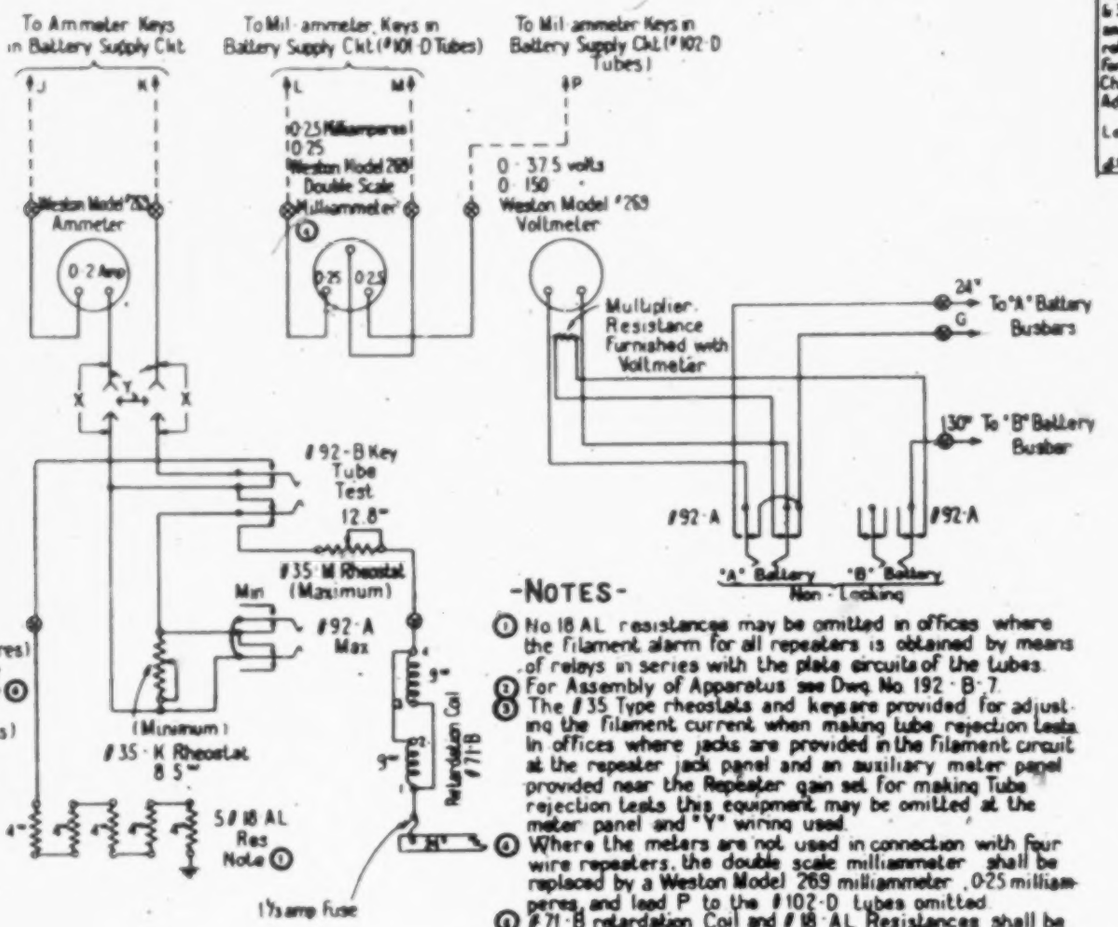
AMERICAN TELEPHONE & TELEGRAPH CO.
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TELEPHONE REPEATER EQUIPMENT

Cordless Ammeter, Milliammeter and Voltmeter Circuits
For use with Reading Type Telephone Repeaters

191-B-99
Standard
Replacing 704-X-803
Repl 191-B-99 of 10-30-22

Engineer
Draftsman
Checked by
Made Standard 10-30-22
Redrawn:-
Removed 178-A Switch, 1.1 Lock, key & 92 B key for adjusting plate potential when making 1.1 tests. Added 35-K & 35-M rheostats 92 A and 92-B Keys, 71 B ret. coil and 18 A.L. res. for tube rejection tests. Changed Notes 1 and 3. Added Note 6
Log No. 5 4806 4-27-23
Issue 5



-APPARATUS-

1 Weston Model 269 ammeter (0-2 amperes)
1 Weston Model 269 milliameter, double scale (0-25 and 0-75 milliamperes) Note 2
1 Weston Model 269 voltmeter with multiplier (0-37.5 volts and 0-150 volts)
2 Keys #92 A
1 Key #92 A
1 Key #92 B
1 Rheostat #35-M
1 #35-K
5 Resistances #18 AL
1 Retardation Coil #71-B
Note 1

-NOTES-

1. No 18 AL resistances may be omitted in offices where the filament alarm for all repeaters is obtained by means of relays in series with the plate circuits of the tubes.
2. For Assembly of Apparatus see Dwg. No. 192-B-7.
3. The #35 Type rheostats and keys are provided for adjusting the filament current when making tube rejection tests. In offices where jacks are provided in the filament circuit at the repeater jack panel and an auxiliary meter panel provided near the Repeater gain set for making Tube rejection tests this equipment may be omitted at the meter panel and "Y" wiring used.
4. Where the meters are not used in connection with four wire repeaters, the double scale milliammeter shall be replaced by a Weston Model 269 milliammeter, 0-25 milliamperes, and lead P to the #102-D tubes omitted.
5. #71-B retardation Coil and #18-AL Resistances shall be located as specified.
6. ⊗ Designates terminal punchings on meter panel.

15514

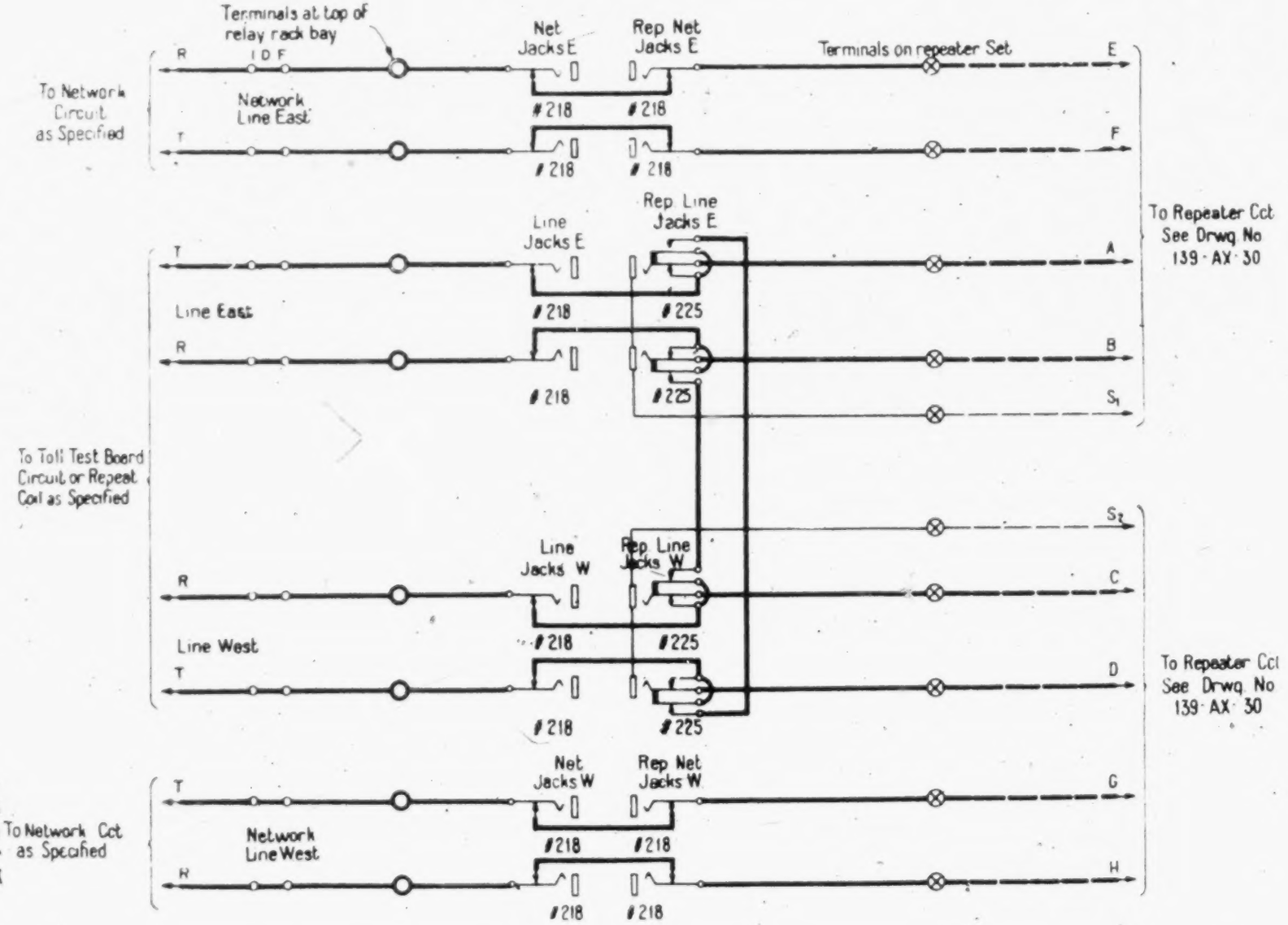
AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
REPEATER JACK CIRCUIT
Arranged for Relay Rack Mounting

191-B-100
Standard
Replacing 704-X-807

Engineer [illegible]
Draftsmen [illegible]
Checked by
Log P-4719-8-25-20
ISSUE 1

Was Provisional
Made Standard
Log No. 3-4306 11-1-22
ISSUE 2



AMERICAN TELEPHONE & TELEGRAPH CO.
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
TALKING AND MONITORING JACKS
For 22 Type Repeaters
Arranged for Relay Rack Mounting

192-B-1
Standard
Replacing 704-X-883

Engineer 2095
Draftsman O.M.
Checked by
Made Standard 11-1-22
Log No. R-4718-9-23-22
ISSUE 1

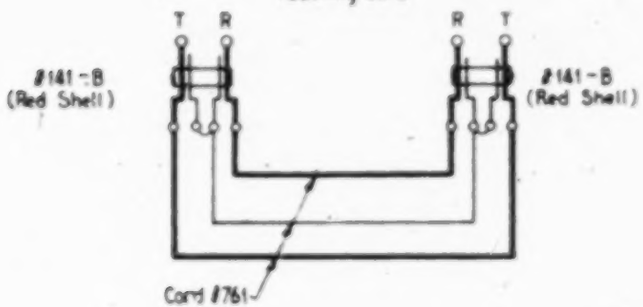
Code No. of Card Loss not shown.
Log No. R7728 9-8-22
ISSUE 2

Was Provisional. Made Standard. Lead "C" was formerly connected to battery supply circuit. Note Thread "To cable & element circuit," etc.
Log No. S-4288 11-1-22
ISSUE 3

Fig 1



Fig 2
Patching Cord



—NOTES—

(1) Patching cords in accordance with Fig 2 shall be provided for the two-wire repeater rack for patching the monitoring jacks to the telephone set and for patching the testing circuit to the repeater line jacks

(2) To cut repeater out insert a dummy plug in the tip monitoring jack

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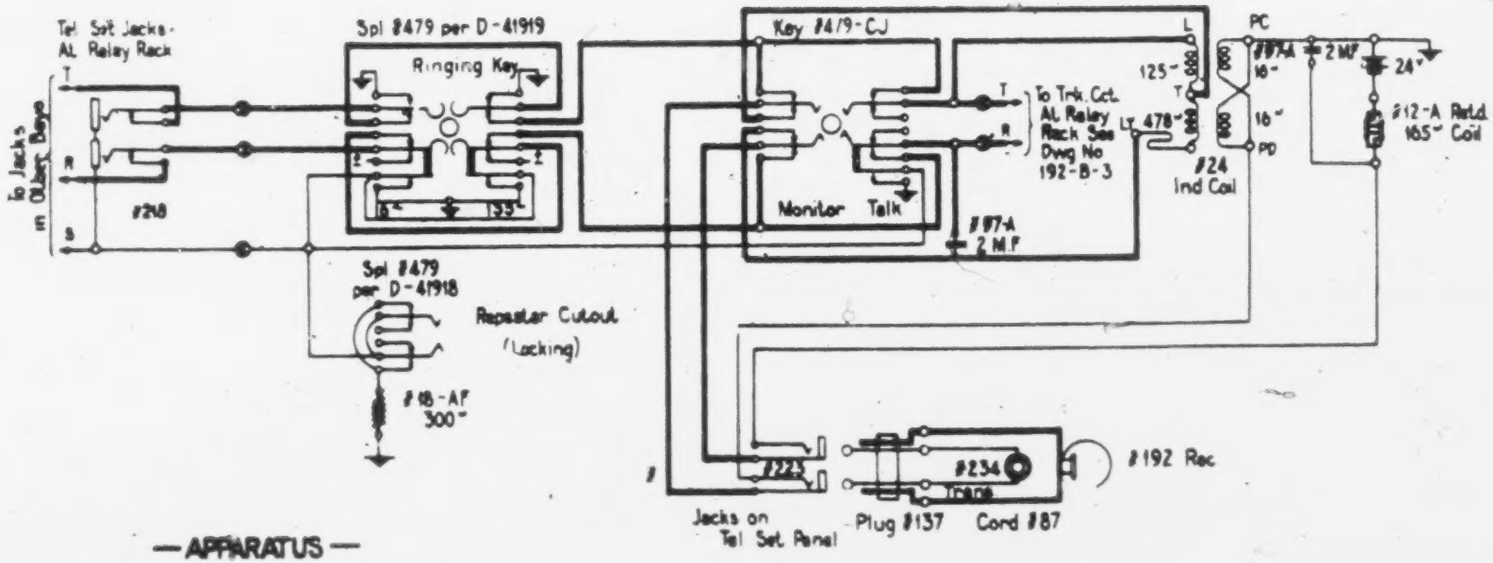
TELEPHONE REPEATER EQUIPMENT
TELEPHONE SET
For use with Reading Type Two-Wire Telephone Repeaters
Arranged for Relay Rack Mounting

192 - B - 2
Standard
Replacing 704 - 729

Engineer [illegible] P.P
Draftsmen D.M.
Checked by
Made Standard 11-1-22
Log No. B-4377-B-25-20
ISSUE 1

#97 Accord were #21-E
#218 Jacks were
labelled #128
Log No R7948 1-7-22
ISSUE 2

Was Provisional Made
Standard # 479-CJ
was Spl #479 per D-41918
Log No. S-4309 11-1-22
ISSUE 3



—APPARATUS—

Per Circuit
1 Key #479-CJ
1 " Spl #479 D-41918
1 " " #479 " D-41919
2 Jacks #223
1 Cord #87
1 Plug #137
2 Condensers #97-A
1 Retard Coil #12-A
1 Resistance #18-AF
1 Induction Coil #24

At each Relay Rack Bay
2 Jacks #218

—NOTES—

There shall be one lead from the 24 volt battery equipped with a 1½ ampere fuse for each circuit.

① There shall be one telephone set for each three relay rack bays containing "22" type telephone repeaters except where more may be required to permit two repeater attendants to work at adjacent repeaters simultaneously.

② For assembly of apparatus see Dwg. No. 192-B-10

⊛ Indicates terminal on mounting plate.

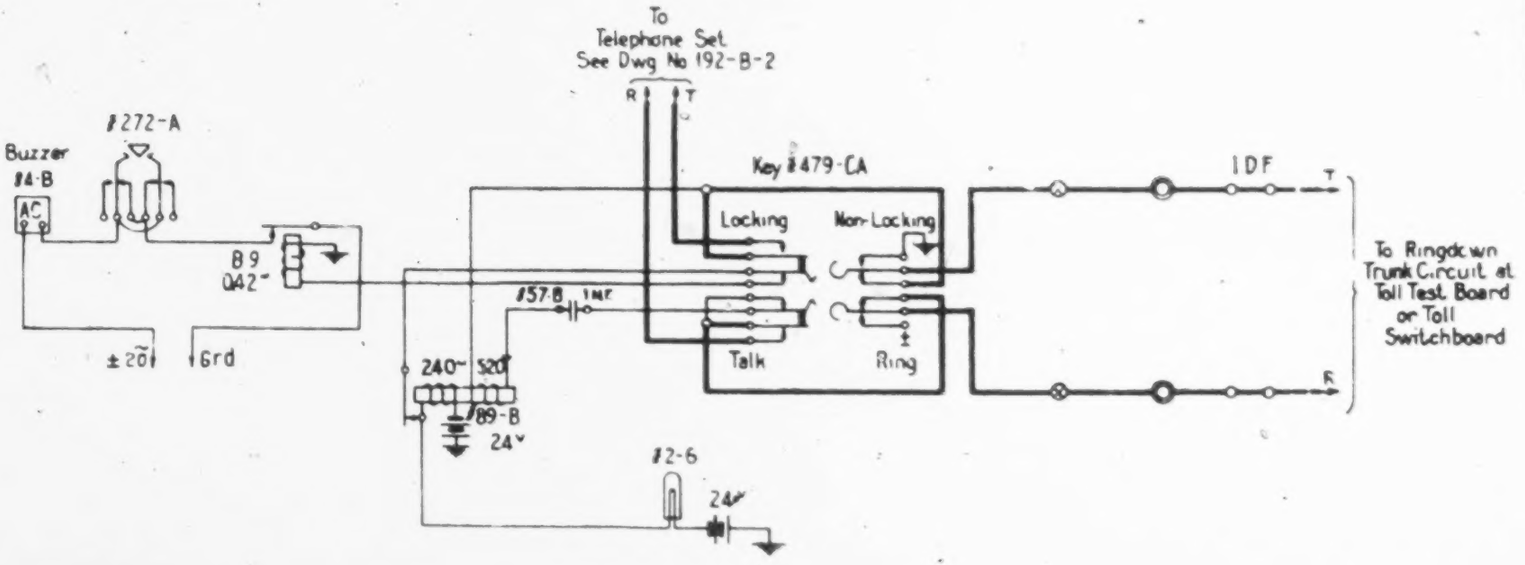
15517

AMERICAN TELEPHONE & TELEGRAPH CO
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TELEPHONE REPEATER EQUIPMENT
TWO WAY RINGDOWN TRUNK
For Use With "22" Type Repeaters
Arranged for Relay Rack Mounting

192-B-3
Standard
Replacing 704-X-806

Engineer
Draftsman O M
Checked by L
Made Standard M-1-22
Log No P-3-10-0
ISSUE 1
#57 B Condenser was #57a
Log No P 7513 4-7-22
ISSUE 2
Was Provisional Made
Standard #479-CA was
Std #479 per D-41917
Log No S 4310 11-1-22
ISSUE 3



—APPARATUS—

Per Circuit

1 Key #478-CA
1 Relay #89-B
1 Condenser #57-B
1 Lamp #2-G
1 " Cap #2-AY
1 " Socket #34
1 Relay B9
1 Key #272-A
1 Buzzer #4-B

—NOTES—

There shall be one lead from 24 volt battery equipped with a 1-1/3 ampere fuse per five circuits

⊗ Indicates terminal on telephone set mounting plate

○ Indicates terminal at top of relay rack bay.

15518

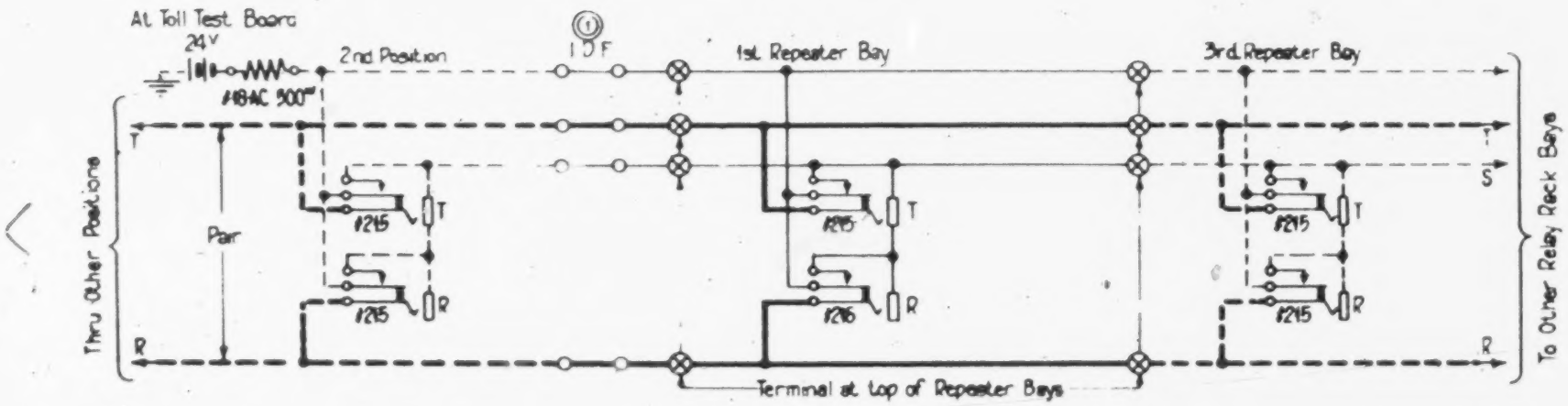
AMERICAN TELEPHONE & TELEGRAPH CO
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TELEPHONE REPEATER EQUIPMENT
TEST BOARD – RELAY RACK INTERPOSITION TRUNK

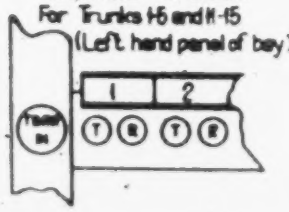
192-B-4
Standard
Replacing 704-X-721
Replacing 192-B-4 of 3/17/22

Engineer
Draftsman
Checked by
Redrawn Ring Jack was #223 Added Notes (3) and (4) Added figure showing arrangement of jacks for "In" and "Out" Trunks. Added test on ring jack
Log No. P7520 4-7-22
Issue 3

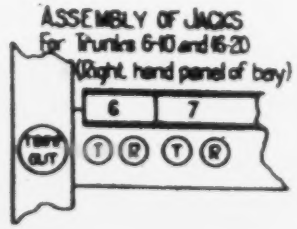
Was Provisional
Made Standard
At rep. rack, designs were 1st bay, 2nd bay, etc.
Log No. S-4327 11-3-22
ISSUE 4



ASSEMBLY OF JACKS
For Trunks 1-5 and 11-15
(Left hand panel of bay)



ASSEMBLY OF JACKS
For Trunks 6-10 and 16-20
(Right hand panel of bay)



APPARATUS

2 Jacks #215, for each relay rack bay

NOTES

(1) Wiring between the relay rack and the test board to be direct or through the I.D.F as specified.
(2) At relay rack, trunks 1 to 10 shall be multipled in the odd numbered bays, and trunks 11 to 20 multipled in the even numbered bays.
(3) In offices where four-wire telephone repeaters are to be used trunks 1-5 and 11-15 shall be run in cables separate from trunks 6-10 and 16-20. Trunks 1-5 and 11-15 shall be used for patching circuits on the input side of 4-wire repeaters and shall not be included in any cables carrying the output circuits of 4-wire repeaters. Trunks 6-10 and 16-20 shall be used for patching circuits on the output side of 4-wire repeaters and shall not be included in any cables carrying the input circuits of 4-wire repeaters.
(4) In offices where no four-wire telephone repeaters are to be provided, all test board-relay rack interposition trunks may be run in the same cable instead of separating "In" and "Out" circuits as specified in Note (3)

15519

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TELEPHONE REPEATER EQUIPMENT

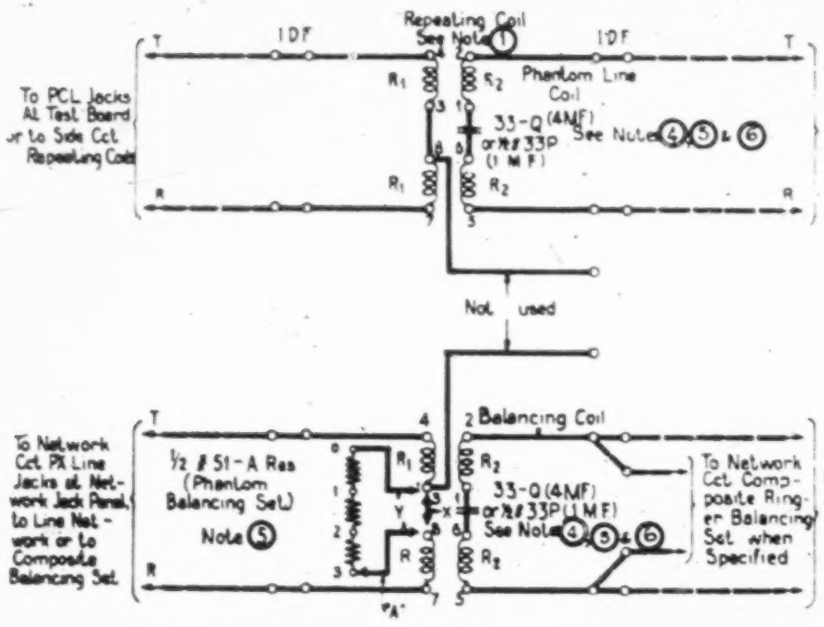
Phantom Line Coil and Repeating Coil Balancing Set
For Use Only On Phantom Circuits

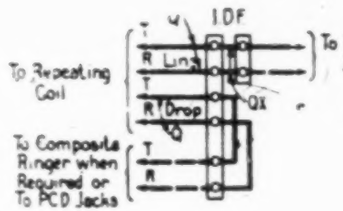
192-B-5
Replacing 70-I-X-559

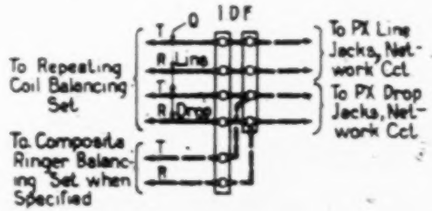
Craftsman O.M. Checked by
Log No. P-4714 8-25-20
ISSUE 1

Changed Note (4) Was Provisional Made Standard
Log No. S-2928 9-13-21
ISSUE 2

Added notes 4, 5 & 6. #33P condenser specified when 1 mf is required. Changed 55 coils to 75 coils.
Log No. S-4101 9-16-22
ISSUE 3







—APPARATUS—

1 Repeating Coil per Note (1)
2 Condensers #33-Q or 1 condenser #33P per Notes (4) & (6)
½ Resistance #51-A when specified Note (7)

Table 1

Coil No	Impedance Ratio Line Side Term. 4,3 - 8,7	Impedance Ratio Drop Side Term 2,1 - 6,5	Resistance R_1	Resistance R_2
75-A	1 To	1	22	21
75-B	1 -	1.62	14	21
75-C	1.62 -	1	22	13
75-D	1 -	2.66	8.5	22
75-E	2.66 -	1.	22	8.5

Table 2

Coil on Side Circuits	Connect Lead "A" to Point
No. 75-A	3
" 75-B	2
" 75-C	3
" 75-D	1
" 75-E	3

—NOTES—

(6) Where repeating coil does not form shunt preventing proper operation of direct current supervisory relays in cords or trunks, the condensers shall be omitted except on circuits equipped with DC metallic telegraph.

(1) Repeating coils shall be as specified and each shall be mounted on the same base with its balancing coil in the network circuit. The types of coils used are as shown in Table 1.

(2) Type A composite ringers only shall be used in connection with this circuit.

(3) Pairs marked "Q" in the cabling diagram are duplex cable and pairs marked "QX" are in duplex distributing frame wire. Each pair marked "Q" or "QX" shall be in the same quad with the pair with which it would form a phantom.

(4) When repeating coils are used on small gauge cable circuits equipped for DC metallic telegraph, #33P (1MF) condensers shall be used, in all other cases where condensers are needed #33-Q(4MF) cond's shall be used.

(5) The same type of condenser shall be used in the line circuit and in the network. When 4 MF are required (see Note 4) the condenser shall preferably be #33-QD, #33-QE, #33-QG or #33-QH but #33-QF may be used.

(7) Use "Y" wiring when phantom balancing set is required. Use "X" wiring when phantom balancing set is not required. The phantom balancing set shall be provided as shown only for phantom lines derived from composited side circuits and shall be furnished only when specified. Lead "A" shall be connected as shown in Table 2. The Phantom Balancing Set, where specified shall be located adjacent to the associated repeating coil or in any other convenient location on the coil rack.

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Department of
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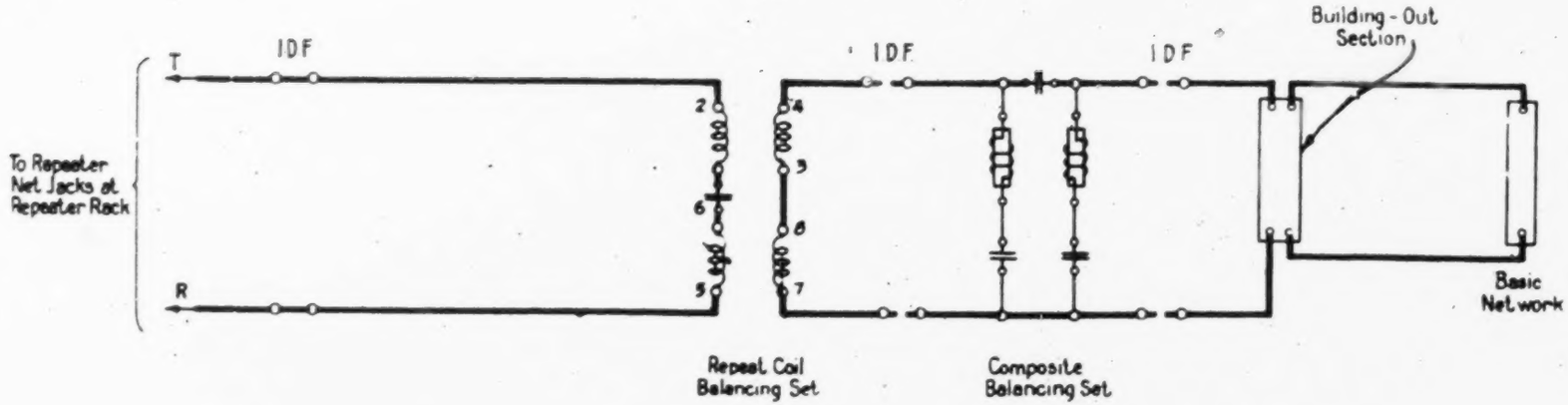
TELEPHONE REPEATER EQUIPMENT

NETWORK CIRCUIT

Without Jacks

192-BX-6
Standard
Replacing 704-X-723

Engineer Draftsman O.M. Checked by Made Standard 11-1-22 Log No. P-4713-8-23-20 ISSUE 1
Removed Half Load Retard. Coil. Log No. P 5713 4-12-21 ISSUE 2
Marked replacing 704-X-723. Log No. P 6566 9-27-21 ISSUE 3
Was Provisional Made Standard Log No. S-4311 11-1-22 ISSUE 4



—NOTES—

The balancing equipment for each circuit shall be furnished only as specified.

AMERICAN TELEPHONE & TELEGRAPH CO
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TELEPHONE REPEATER EQUIPMENT

RINGING RELAY CIRCUIT

For Two Wire Cable Type Repeater Circuits

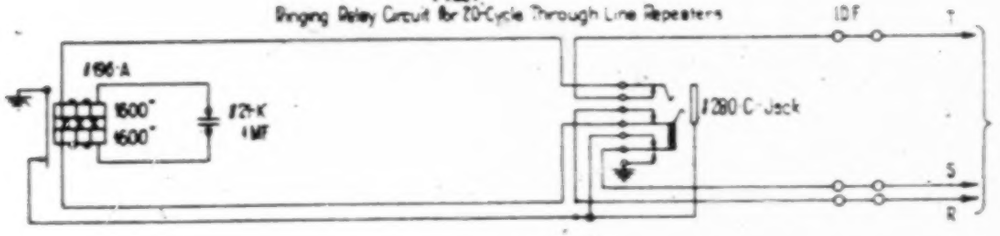
193-B-82
Standard
* Partly Replacing 187-B-22

Logged (21-A)
Drawn MCC
Checked
Made Standard 11-1-22
Log No P-8714 4-10-21
ISSUE 1

Infigt S & R Lead from relay were reversed at jack
In Fig 3 #91-A coil was #71-C, & D-76423 coil was ½ D-14692, #57-G or ½ #33 coil was #57-A or ½ #33-A (2 MF) in parallel with #57-F or ½ #33-L (½ MF)
Log No P7363, 3-11-22
ISSUE 2

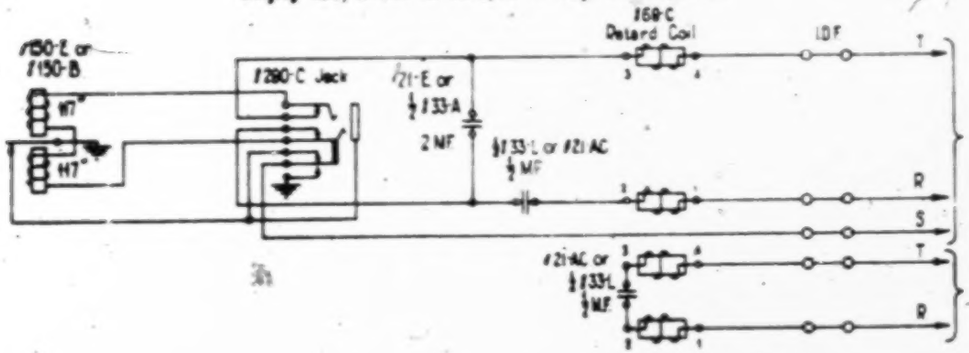
Was Provisional Made Standard Added Note ① and 150-B relay Added 21-E & 21-AC condensers. M.A.S.
Log No 5-4142. 11-1-22
ISSUE 3

FIG. 1
Ringing Relay Circuit for 20-Cycle Through Line Repeaters



To Repeater Circuit Line Side of #33-Q or #57-Q Condensers. See Dwgs. Nos. 137-AX-72 or 139-AX-30

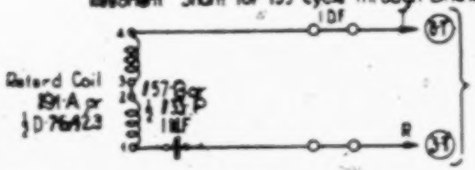
FIG. 2
Ringing Relay Circuit for 135-Cycle Through Line Repeaters



To Repeater Circuit Line Side of #33-Q or #57-Q Condensers. See Dwgs. Nos. 137-AX-72 or 139-AX-30

To Repeater Circuit Net Side of #33-Q or #57-Q Condensers. See Dwgs. Nos. 137-AX-30 & 139-AX-30

FIG. 3
Resonant Shunt for 135 Cycle Through Line Repeaters



To Through Line Repeater, Output Transformer Terminals 8T and 3T

-APPARATUS-

FIG. 1
1 Relay #196-A
1 Condenser #21-K
1 Jack #280-C

FIG. 2
1 Relay #150-E or #150-B
1 Condenser #33-A or #21-E
1 Condenser #33-L or #21-AC
1 Jack #280-C
1 Retardation Coil #168-C

FIG. 3
For Coil Rack Mounting
1 Retard Coil per D-76423
1 Condenser #33-P
For Relay Rack Mounting
1 Retardation Coil #195-A
1 Condenser #57-B

— NOTES —

① The #150-E relay may be replaced by a #150-B relay in cases where sufficient signaling range cannot be obtained with #150-E relay on account of interference

② Jacks to be mounted at the relay rack or coil rack near the associated relays

15522

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT

METALLIC COMPOSITE BALANCING SET

For Balancing Metallic Composite Sets

193-B-99
Standard

Engineer [illegible]
Draftsman
Checked by

Log No P-5972 3/2/21
ISSUE 1

Added code of ½ 44-L coil Added D-Spec No. of ½ M.F cond. Fig 1 Removed note.
Log No P-7492, 4-1-22
ISSUE 2

Was Provisional Made Standard
Log No. S-4313 11-1-22
ISSUE 3

FIG. 1
SIDE CIRCUIT ARRANGEMENT

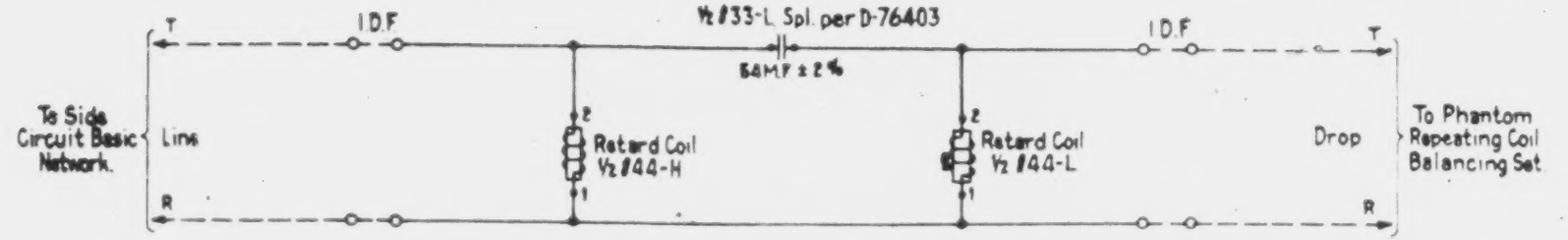
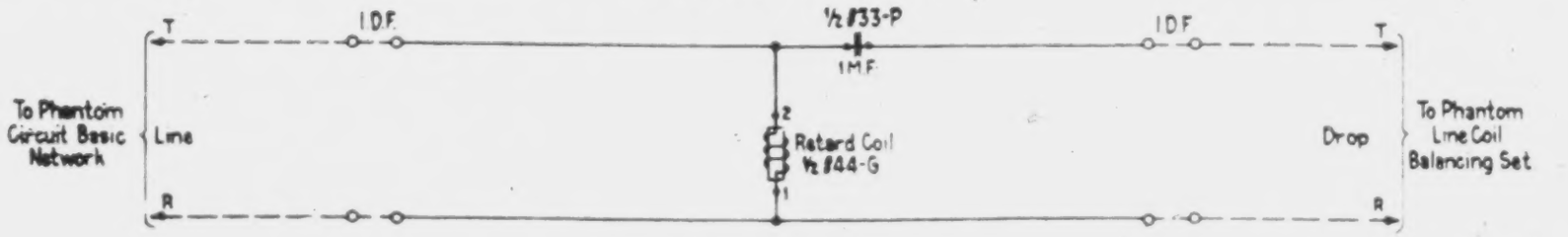


FIG. 2
PHANTOM CIRCUIT ARRANGEMENT



— APPARATUS —

FIG. 1
½ Retardation Coil #44-H
½ " " #44-L
½ Condenser Spl. #33-L per D-76403

FIG. 2
½ Retardation Coil #44-G
½ Condenser #33-P

15523

American Telephone & Telegraph Co.
Department of
Development & Research

TELEPHONE REPEATER EQUIPMENT
BATTERY SUPPLY CIRCUIT

For use with Reading Type Two-Wire Telephone Repeaters
For Offices where only two Tubes are connected in Series

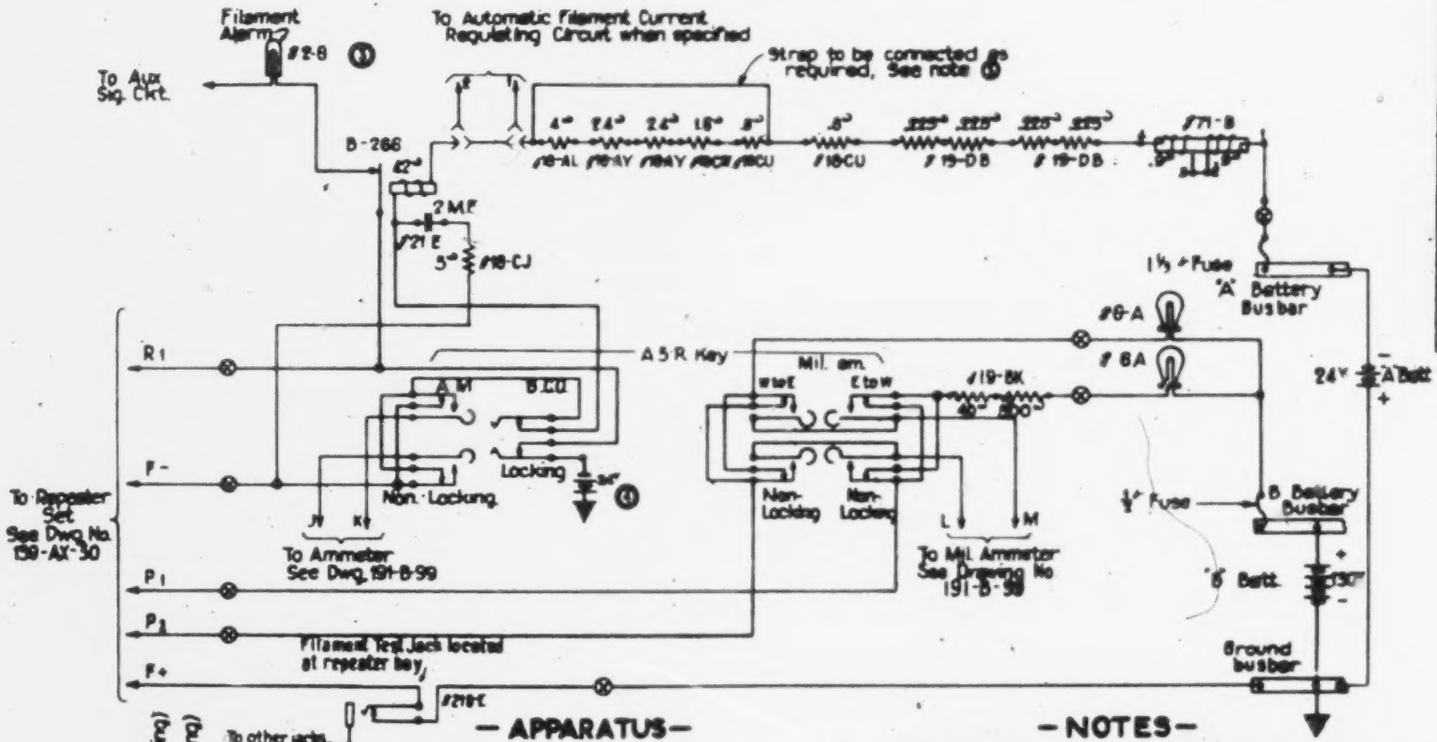
191-B-10
Standard
Partly Replacing
191-B-95

Engineer J.J.
Draftsman
Checked by
Log No. P8772, 11.15.22
Issue 1

Was Provisional. Made Standard
Log No. S-4392, 11-9-22
ISSUE 2

A5R key was A5H
Log No. S-4645, 2-26-23
ISSUE 3

In note (2) 7/15 Ga. cable were specified max. res. of one ohm per mile. Changed to #16 Ga. Jack and note (3) Res. of field coil was shown as 3" per unit. E to W keys were W. W to E keys were W. Mil-am keys were thrown to left for E-W and to right for W-E.
Log No. S-4803 4.22.23
ISSUE 4



—APPARATUS—

1	Key A5R
1	Retardation Coil #71-B
1	Resistance #18-CJ
1	" #18-AL
1	" #18-CW
2	" #18-AY
2	Resistances #18-CU
2	" #19-DB
2	Resistance Lamps #8A
2	Bryant Receptacles #101401
1	Relay B-266
1	Lamp #2 B
1	Cap #2-AY
1	Condenser #21-E
1	Resistance #19-BK
1	Jack #218-E Note (1)

—NOTES—

4 Indicates terminal at top of battery supply bay
(1) Resistances in filament circuit shall be provided as shown.
Sufficient resistance shall be strapped out to maintain the proper filament current.
(2) #16 Gauge non duplex lead covered Cable shall be used between fuse board and relay rack and between the relay rack and repeater set. The resistance of the wiring and cabling in the battery supply circuit shall not exceed 1.0 ohm
(3) Lamp Socket is a part of A5R Key. Lamp and cap are specified separately.
(4) There shall be one lead from the 24 V battery equipped with a 1½ ampere fuse for supplying the signalling battery to each circuit.
(5) Filament circuit test jack shall be furnished when specified. When furnished the jack shall be located in the repeater jack panel.

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AMERICAN TELEPHONE & TELEGRAPH CO
Department of Development and Research

TELEPHONE REPEATER EQUIPMENT

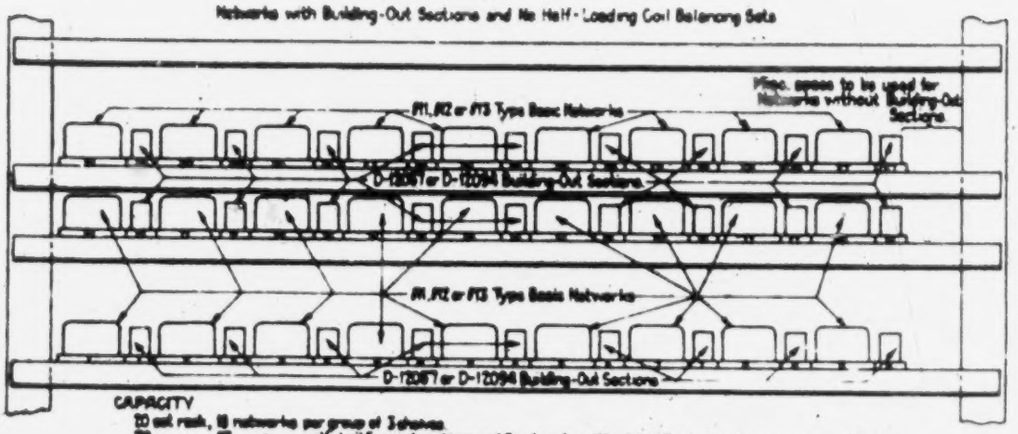
ARRANGEMENT OF BASIC NETWORKS, BUILDING-OUT SECTIONS AND HALF LOADING COIL BALANCING SETS AT COMPOSITE RACK

142-A-65
Standard
Replacing 704-A-557
" 172-BX-31

Engineer
Draftsman
Checked by A.L.G.
Log No. S-23313-9-13/71
ISSUE 1
Partial replacing
172-BX-51
Log No. S-[illegible]-9-14-72
ISSUE 2

FIG 1

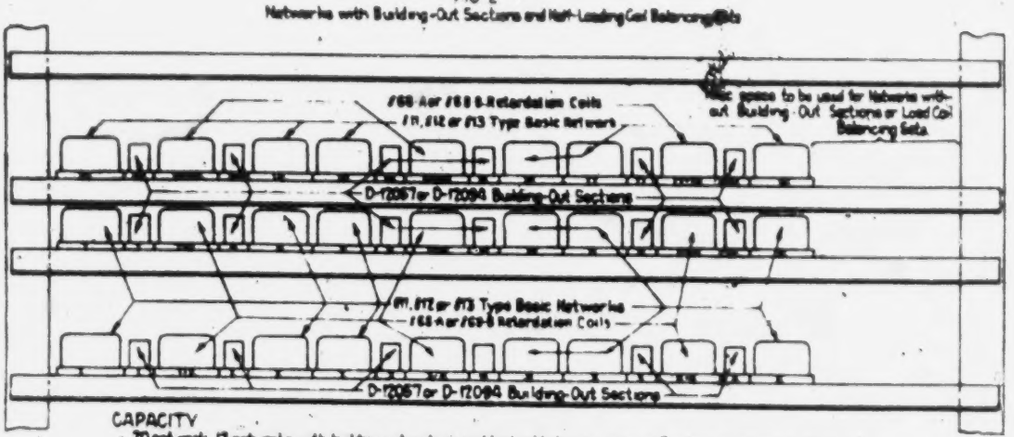
Networks with Building-Out Sections and No Half-Loading Coil Balancing Sets



CAPACITY
20 unit rack, 18 networks per group of 3 shelves
30 " " 27 " with building-out sections, and 3 networks without building-out sections, per group of 3 shelves

FIG 2

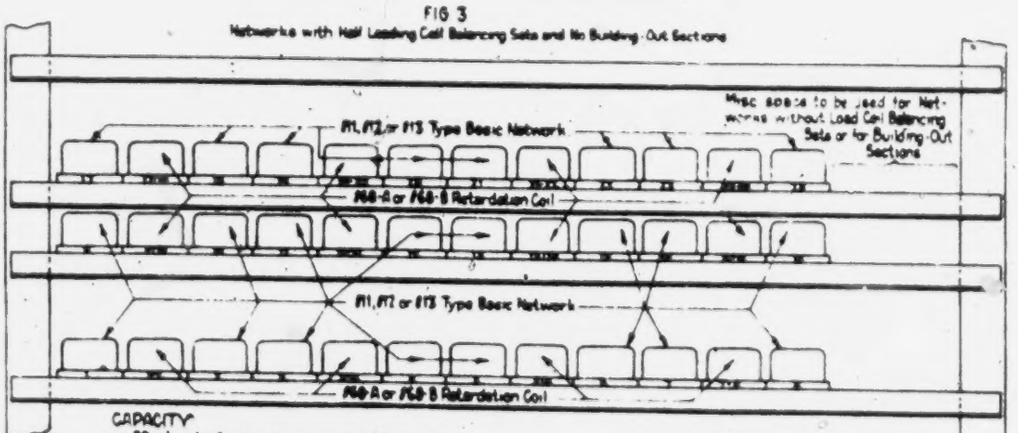
Networks with Building-Out Sections and Half-Loading Coil Balancing Sets



CAPACITY
20 unit rack, 12 networks with building-out sections and load coil balancing sets, and 3 networks without building-out sections and load coil balancing sets, per group of 3 shelves.
30 unit rack, 18 networks with building-out sections and load coil balancing sets, and 3 networks without building-out sections and load coil balancing sets, per group of 3 shelves

FIG 3

Networks with Half Loading Coil Balancing Sets and No Building-Out Sections



CAPACITY
20 unit rack, 18 networks per group of 3 shelves
30 " 24 " with load coil balancing sets, and 6 networks without load coil balancing sets, or 12 building-out sections, per group of 3 shelves

15525

AMERICAN TELEPHONE & TELEGRAPH CO.
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
NETWORKS

Arrangement of Composite Balancing Sets at Composite Rack

172-B-32
Standard
Replacing 172-B-32 of 1/21/16

Engineer
Draftsmen
Checked by

Redrawn, Marked Replacing 172-B-32 of 1/21/16 Omitted Repeating Coil Bal Set.
Log No. 14263 July 18, 1916

Issue 3
Log No. 18478 Apr. 13, 1917

Issue 4

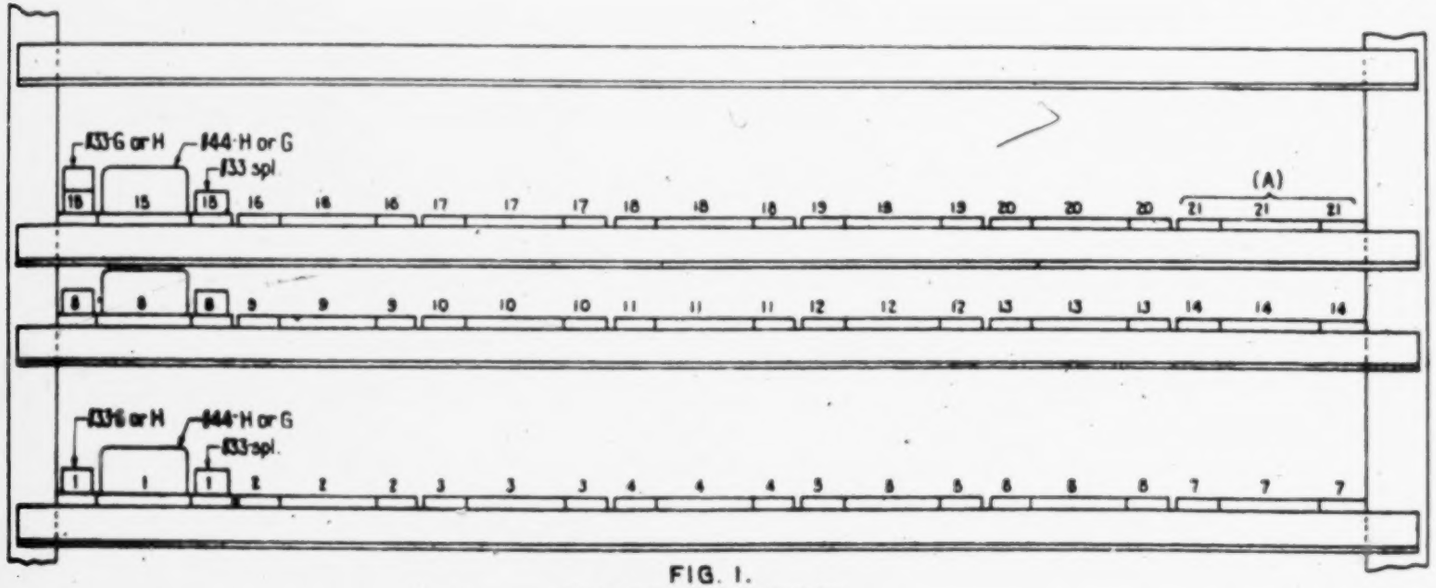


FIG. 1.

COMPOSITE BALANCING SETS
Capacity 20 Set Rack, 12 Sets per Group of 3 Shelves
" 30 " " 21 " " " " 3 "
(A)-Terminated at different Distributing Frame Block, when equipped

15526

AMERICAN TELEPHONE & TELEGRAPH CO.
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
TWO-WIRE THROUGH LINE REPEATER
Assembly of Apparatus at Relay Rack.

187-BX-5
Standard
Replacing 704-X-185

Engineer
Draftsman
Checked by

Log No. P-878 2-5-18

ISSUE 1

Potentiometer was
Designated "C" battery box
as per ES-203874.
Changed Title.

Log No. P 4704 8.16.28

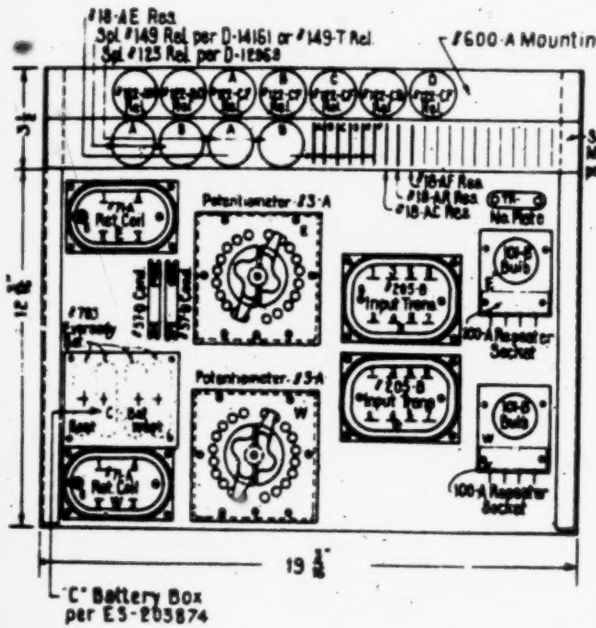
ISSUE 2

Was Provisional
Made Standard

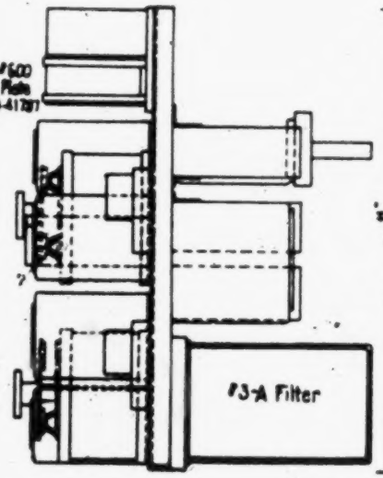
Log No. 3-4318 11-3-28

ISSUE 3

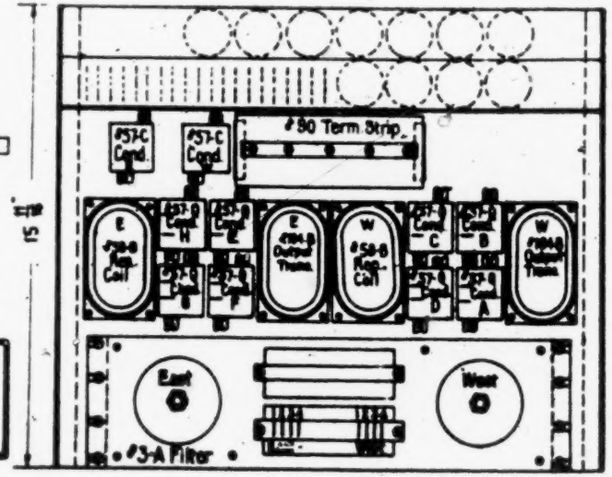
FRONT VIEW

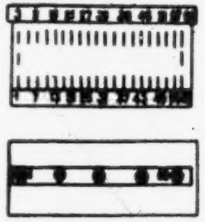


END VIEW



REAR VIEW





Numbering of Terminal Strip

NOTES

Letters refer to reference letters on Dwg No. 139-AX-30

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

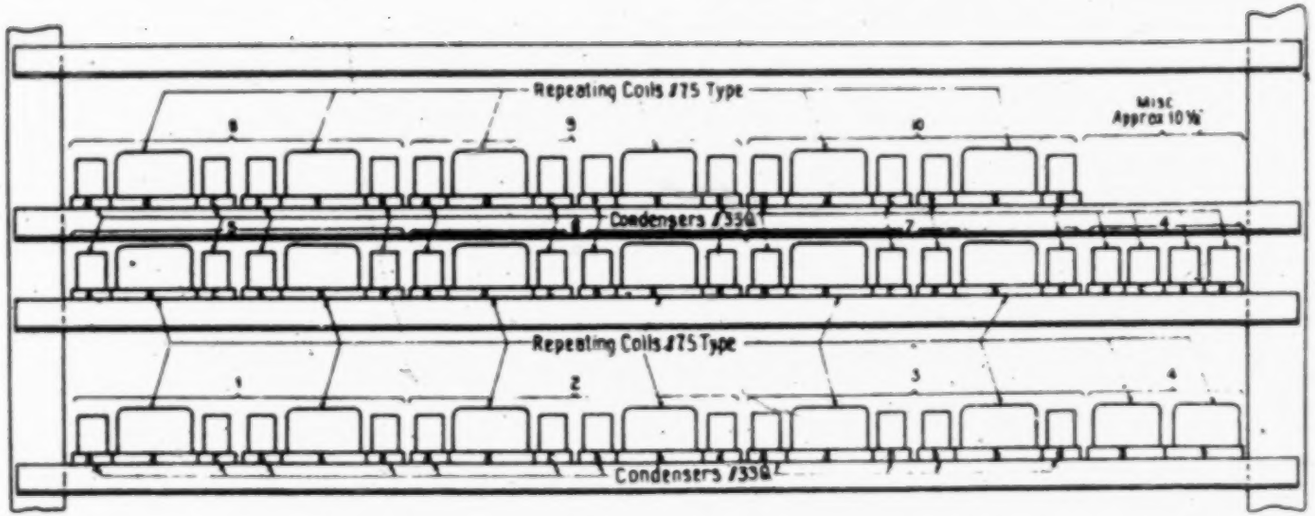
TELEPHONE REPEATER EQUIPMENT
PHANTOM SETS AND REPEATING COIL BALANCING SETS.

Line and Network Coils Mounted on the Same Base
Arrangement of Composite Rack.

187-B-90
Standard
Replacing 176-BX-32

Engr
Drawn by
Checked by
Log No 1/ 1571

ISSUE 1
was issued as interim Standard replacing 176-BX-32
Log No S 2327 & 3121
ISSUE 2
Use of #75 Type Repeating Coils specified in place of #55 Type.
Log No S-3615 8-9-22
ISSUE 3



a and b - Condensers associated with line coils.
c and d - " " " balancing coils.

Capacity
20 Set Rack, 6 Phantom Sets and 6 Phantom Balancing Sets, or 12 Simplex Sets and 12 Simplex Balancing Sets per group of 3 shelves
30 " " ,10 " " " 10 " " " " " or 20 " " " 20 " " " " " "

15528

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
METER PANEL

For use with Reading Type Telephone Repeaters

182-B-7
Standard
Replacing 704-X-1075

Engineer
Draftsmen
Checked by
Log No P-4712-6-25-20
ISSUE 1

Removed note
can covers
Log No P7922 4722
Issue 2

Was Provisional
Made Standard
Log No. 54266 10-30-22
ISSUE 3

#176-A Switch was shown in location of 35-M Rheostat. #19-L Rheostat was shown in location of #35-K Rheostat. #27-C Key was shown in pos. of Tube Test Key
Log No 3-4807 4.2223
Rev ISSUE 4

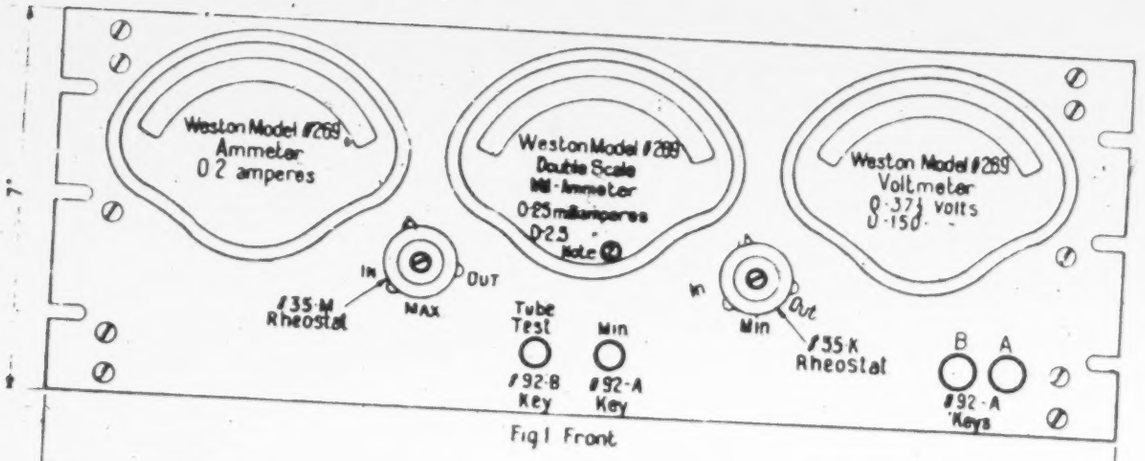


Fig 1 Front

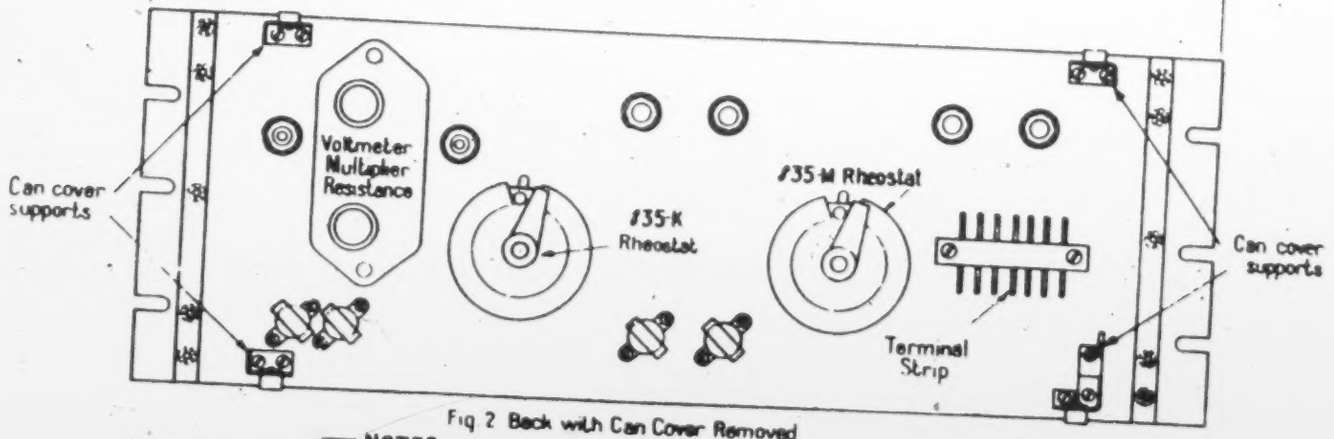


Fig 2 Back with Can Cover Removed

— NOTES —

(2) Double scale mil ammeter shall be replaced by a Weston Model 269 single scale mil ammeter, 0-25 milliamperes, in offices where the meters are not used for Four-Wire Repeater battery supply circu

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
BATTERY SUPPLY CIRCUIT
For "22" Type Repeaters
Assembly of Battery Supply Circuit Keys at Meter Panel

192-B-8
Standard
Replacing 704-X-884

Engineer
Draftsman
Checked by
Redrawn, added Fig 2
Was Provisional Made Standard
Log No. 3-4308-11-1-22
Issue 3

Fig 1 : Front View, 2 tubes in series

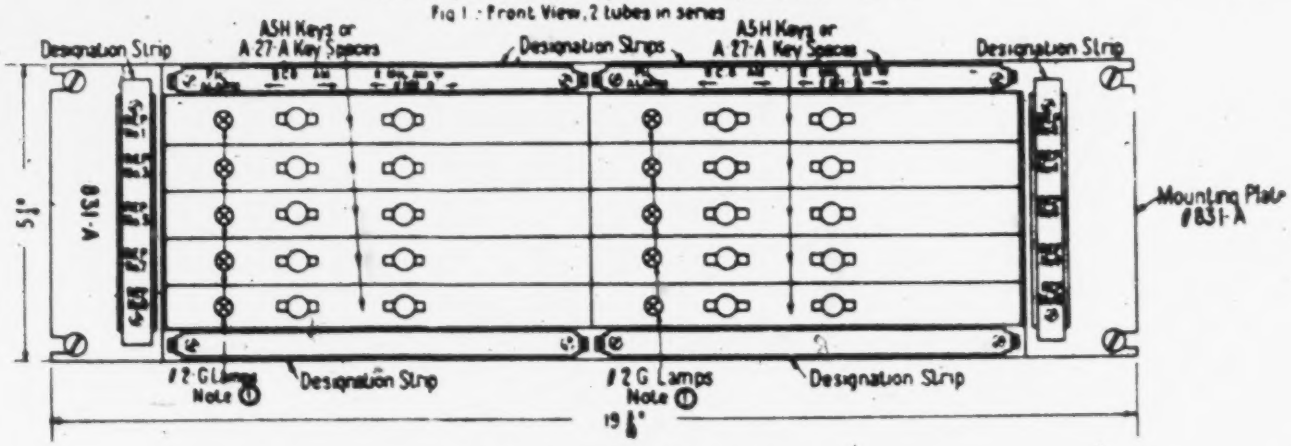


Fig 2 Front View, 4 tubes in series

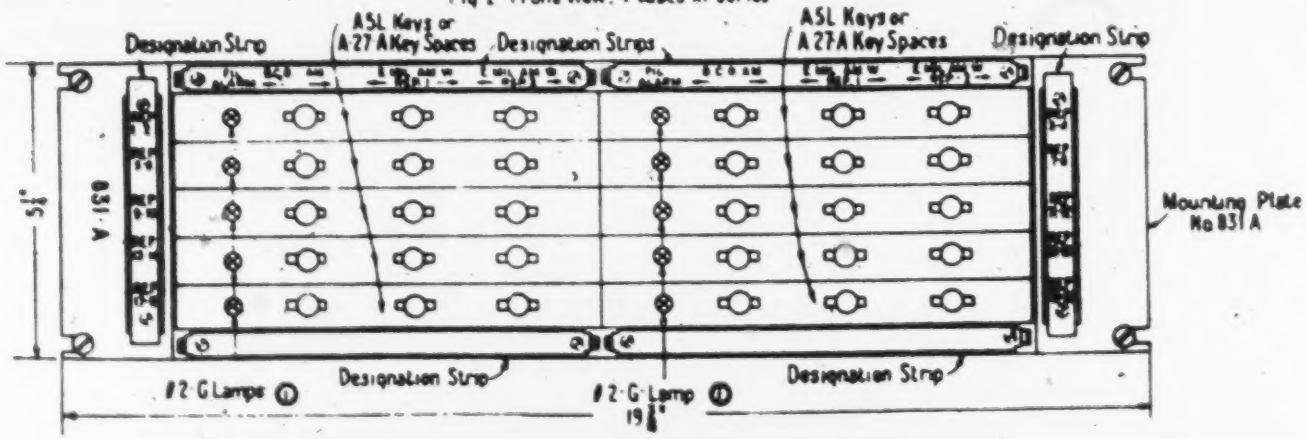
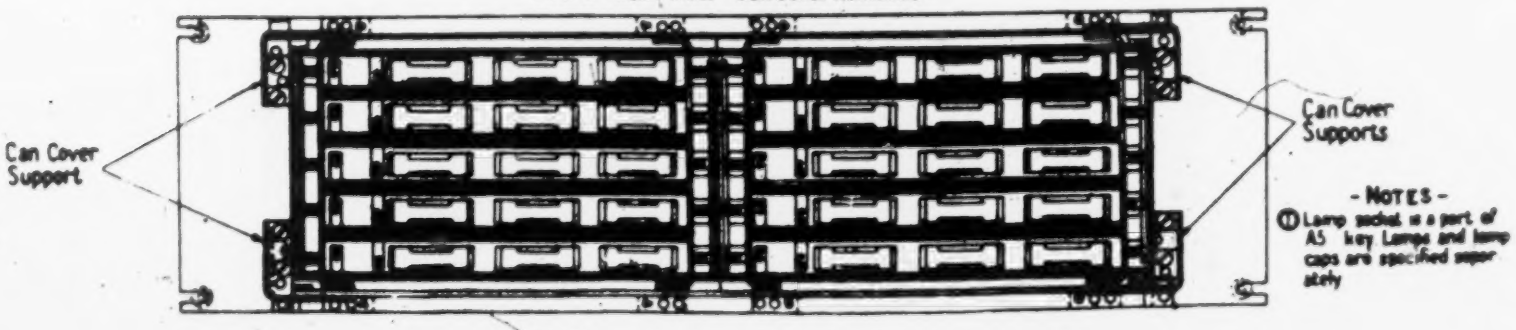


FIG 3 · Rear View · Can Cover Removed



- NOTES -
① Lamp socket is a part of A5 key Lamps and lamp caps are specified separately

15530

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Department of
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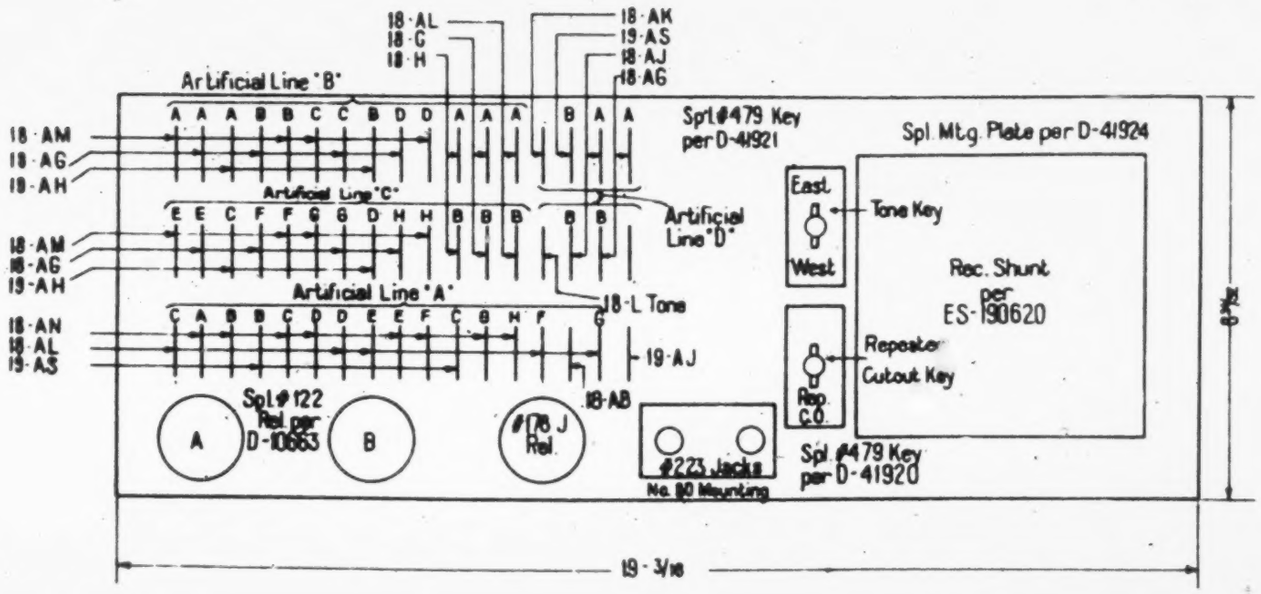
TELEPHONE REPEATER EQUIPMENT
TESTING CIRCUIT

For Testing "22" Type Telephone Repeaters
Assembly of Apparatus

192-B-9
Standard
Replacing 704-897

Engineer
Draftsmen
Checked by
Log No. P-4710-B-2520
ISSUE 1

Was Provisional
Made Standard
Log No. S-4344 11-1-22
ISSUE 2



15531

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
TELEPHONE SET AND RING DOWN TRUNK
Assembly of Apparatus at Relay Rack

192-B-10
Standard

Engineer
Draftsman
Checked by
Redrawn - Apparatus rearranged
Log No. P 7884 4-7-22
ISSUE 2

Was Provisional
Made Standard
Log No. 9438 11-1-22
ISSUE 3

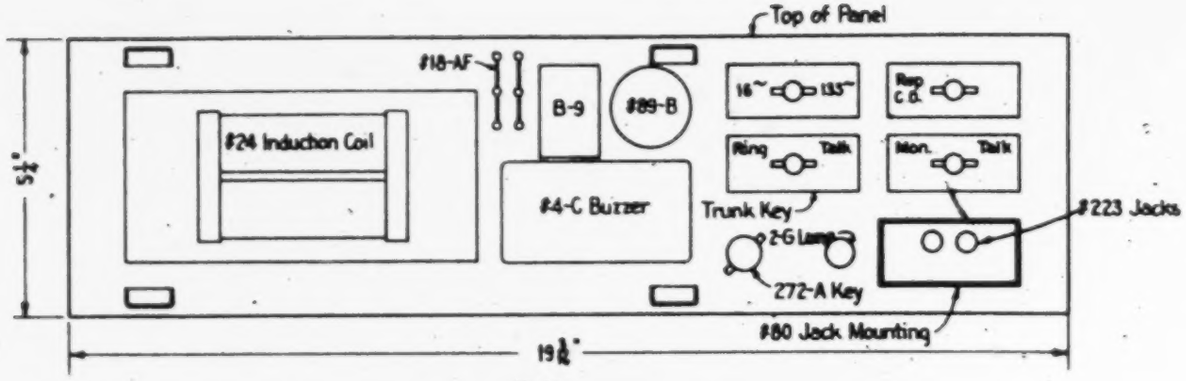


Fig 1
Front View

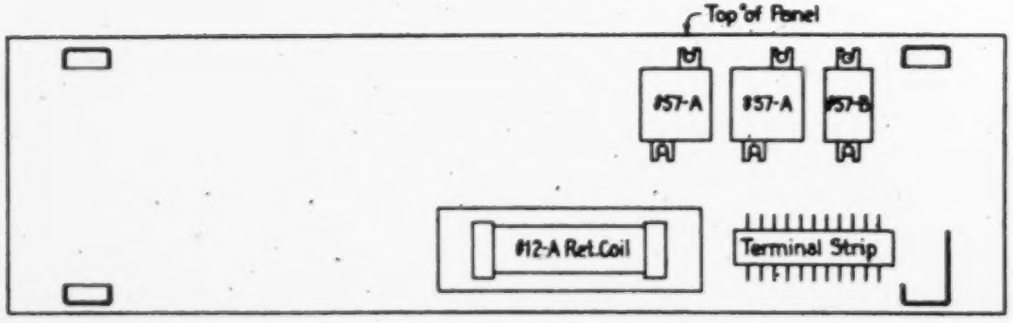


Fig 2
Rear View

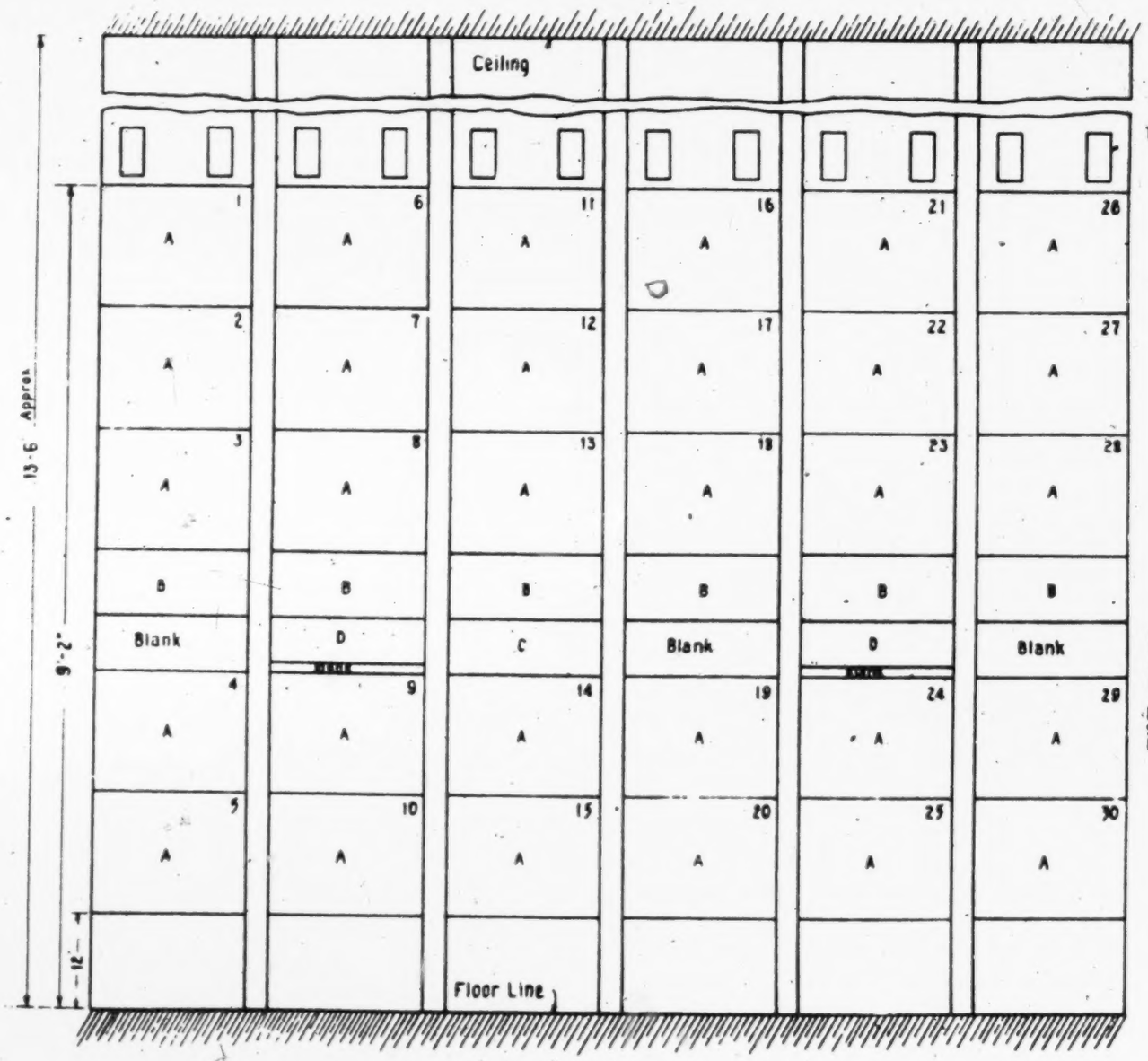
15532

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
22 TYPE REPEATER SETS
Typical Arrangement of Repeater Sets and Associated Equipment at the Relay Rack

192-B-11
Standard
Replacing 704-896

Engineer
Draftsman
Checked by
Made Standard 11-1-22
Log No. R4706 8.25.20
ISSUE 1
Was Provisional. Made Standard. Repeaters numbered from bottom up. Height of apparatus in bay was 8'-10½".
Log No. S-4706. 11-1-22
ISSUE 2



NOTES

A - Repeater Set per 187-B x-5
B - Repeater Jack Panel per 158-B-18
C - Testing Circuit per 192-B-9
D - Telephone Set & Trunk Cct per 328-B-10

No. of repeaters mounted in a bay shall be governed by the ceiling height and shall be as specified.

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT

BATTERY SUPPLY CIRCUITS

Typical Arrangement of Apparatus at Relay Rack
For Offices where Battery Supply Equipment is located at separate Relay Rack Bays

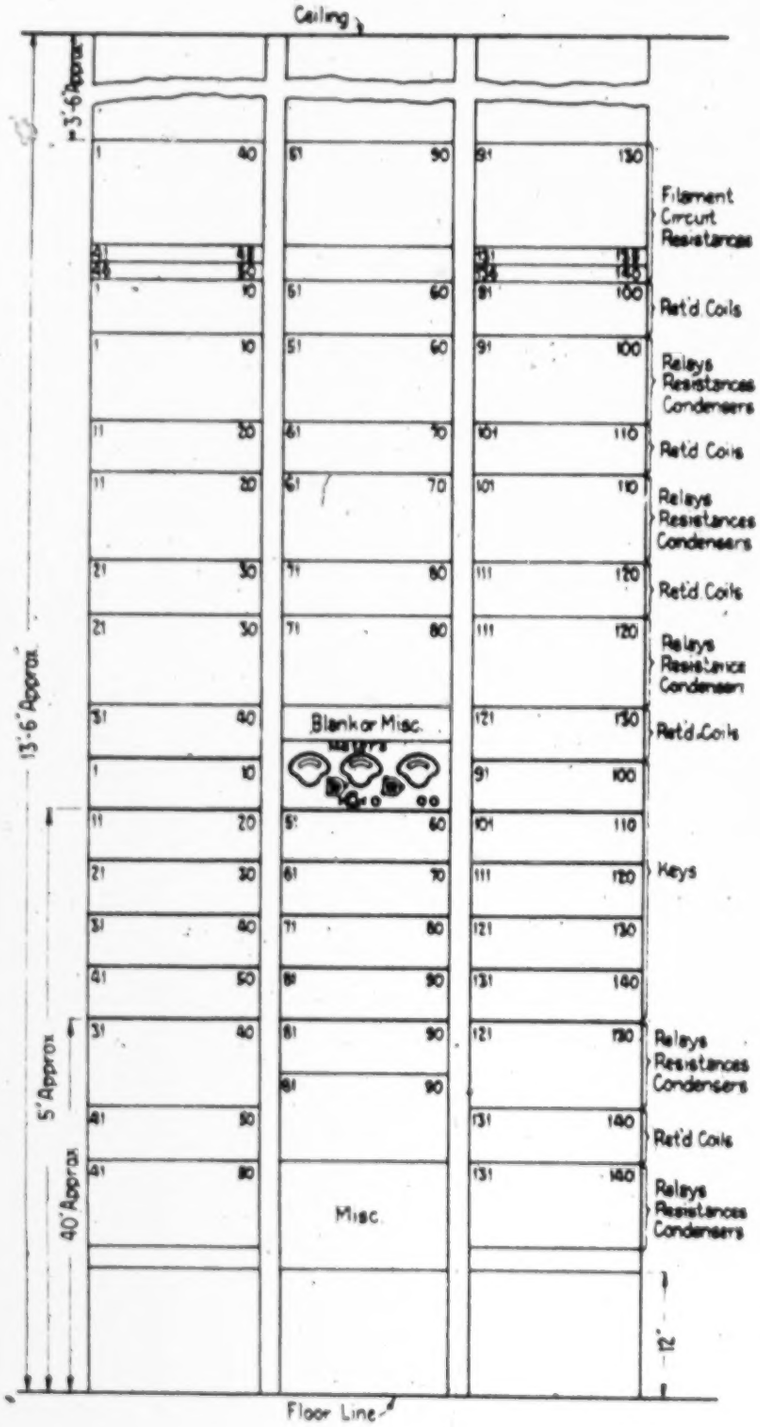
192-B-32
Standard
Replacing 192-B-32 of 12/2/20

Engineer
Draftsman
Checked by

Redrawn - Equipment rearranged. Removed reference to master keys.

Log No. P-7509 4/7/22.
ISSUE 2

Was provisional Made standard.
Log No. S-42868 10-30-22
ISSUE 3



- NOTES -

1. One set of Meters shall be provided for each 3 bays of battery supply equipment and shall be located in the central bay. The meter panel should not be less than 4 feet or more than 6 feet above the floor.
2. When automatic regulating circuits are provided, the necessary relays, resistances etc., shall be located at the relay rack along with the rest of the battery supply equipment.
3. One set of meters may be used for both 22 type and four wire battery supply circuits. Battery supply circuits for both 22 type and four-wire repeaters may be located in the same bay if desirable in order not to require an additional relay rack bay.
4. Filament circuit ground leads need not be looped in horizontal cable form.

15534

9562

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
AUTOMATIC FILAMENT CURRENT REGULATING CIRCUIT
For Use in 24 or 38 Volt Offices

196-B-30
Standard

Engineer B.O.D.
Draftsman
Checked by J.[illegible]
Log No. 3-3683-31-22
ISSUE 1
Added Fig. 4
Log No. S-4226 10-21-22
ISSUE 2

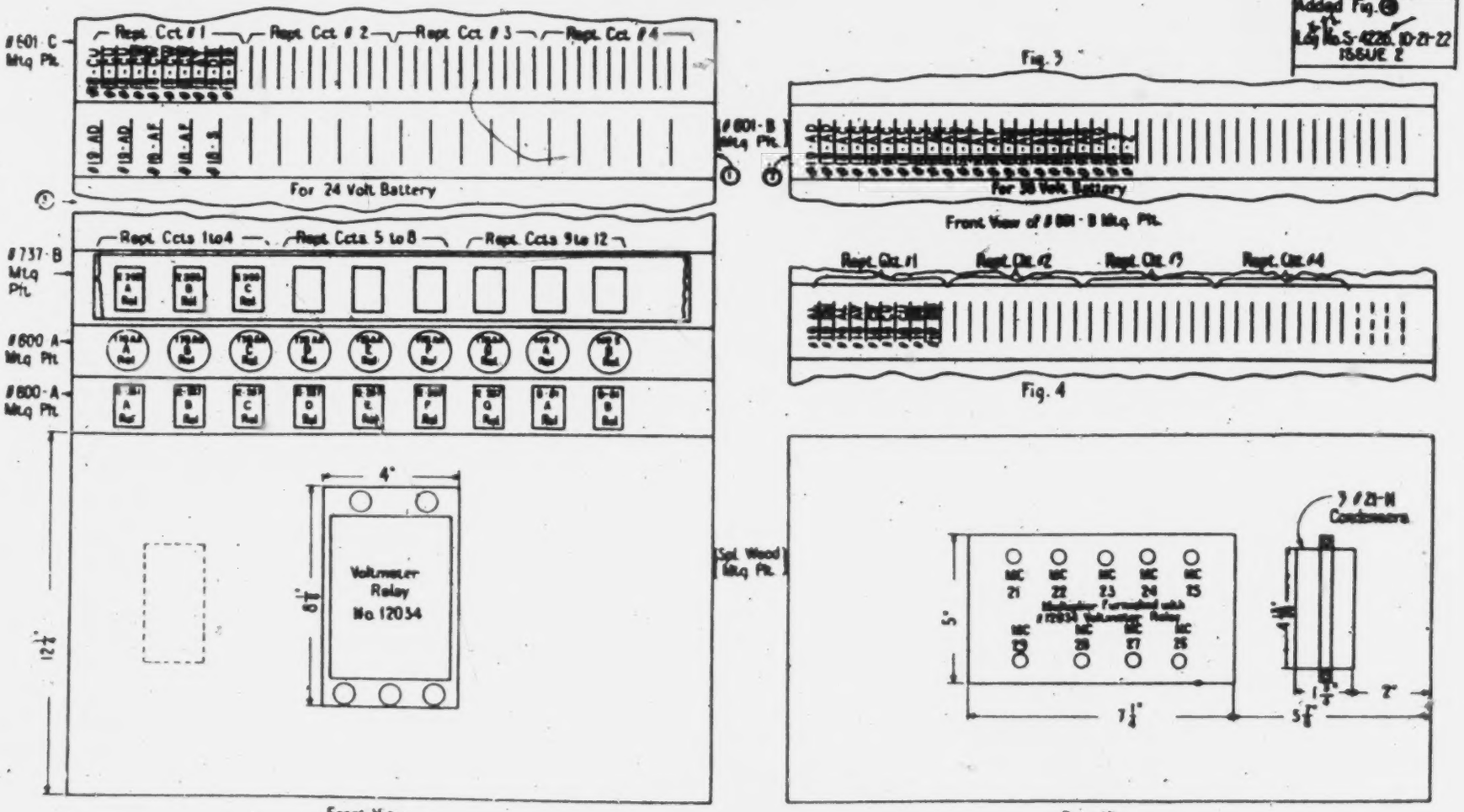


Fig. 3

Front View of #601-B Mtg. Pls.

Fig. 4

Front View
Fig. 1

Rear View
Fig. 2

NOTES

No magnetic material shall be mounted within three inches of the voltmeter relay

① Use this strip in 24 volt offices

② Substitute this strip in 38 volt offices

③ Reserve space for sufficient relay mounting plates to care for ultimate number of repeater not to exceed 400 repeaters.

④ Fig. 4 shows filament circuit resistances where filament current limits are .94 to 1.0 amperes.

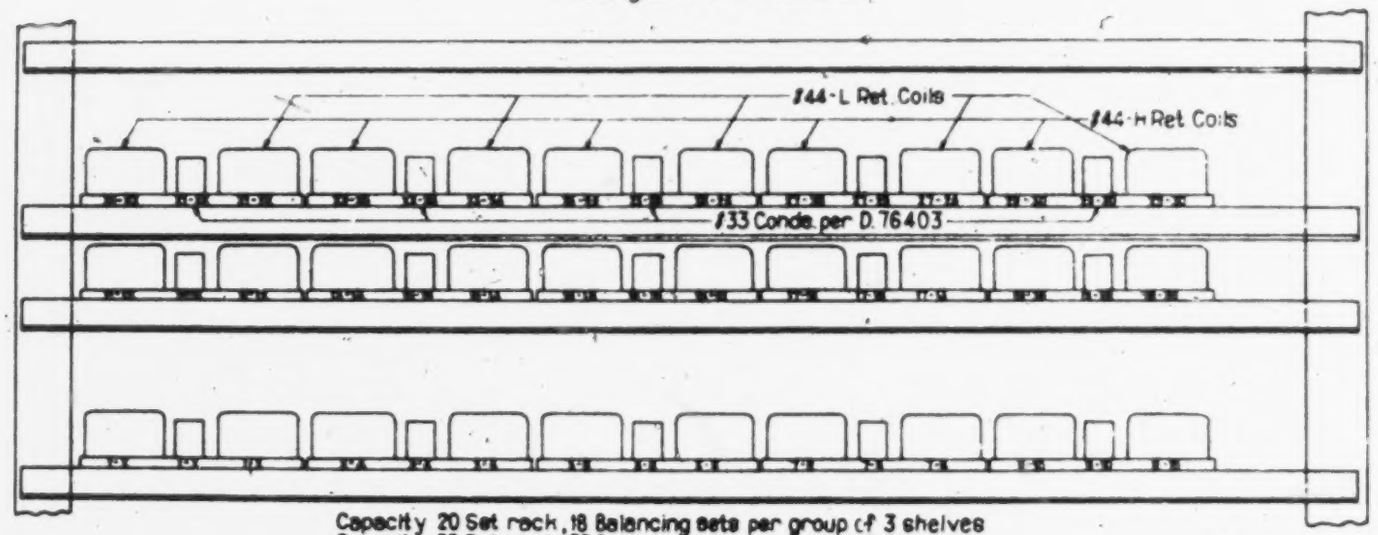
AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
METALLIC COMPOSITE BALANCING SETS
Arrangement at Composite Rack

196-B-57
Standard

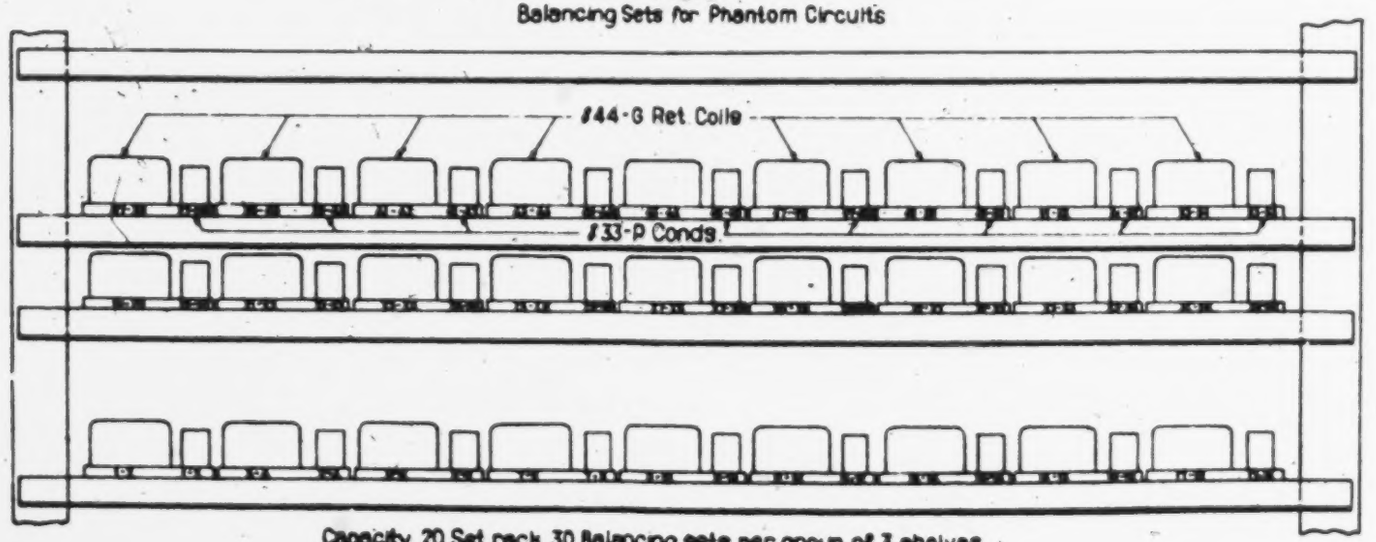
Engineer
Draftsman
Checked by
Log No. P-7439-4/3/22
ISSUE 1
Was Provisional Made Standard
Log No. S-4317-11-1-22
ISSUE 2

FIG. 1
Balancing Sets for Side Circuits



Capacity 20 Set rack, 18 Balancing sets per group of 3 shelves
Capacity 30 Set rack, 30 Balancing sets per group of 3 shelves

FIG. 2
Balancing Sets for Phantom Circuits



Capacity 20 Set rack 30 Balancing sets per group of 3 shelves
Capacity 30 Set rack 54 Balancing sets per group of 3 shelves

15536

AMERICAN TELEPHONE & TELEGRAPH CO
Department of
Development and Research

TELEPHONE REPEATER EQUIPMENT
REPEATER JACK PANEL
Assembly of Jacks at Relay Rack
For Reading Type Two Wire Repeaters.

199-B-19
Standard
Replacing 192-B-17

Engineer
Draftsman
Checked by
Leg No. 54300 11-1-22
ISSUE 1
Leg No. 54811 4-22-23
ISSUE 2

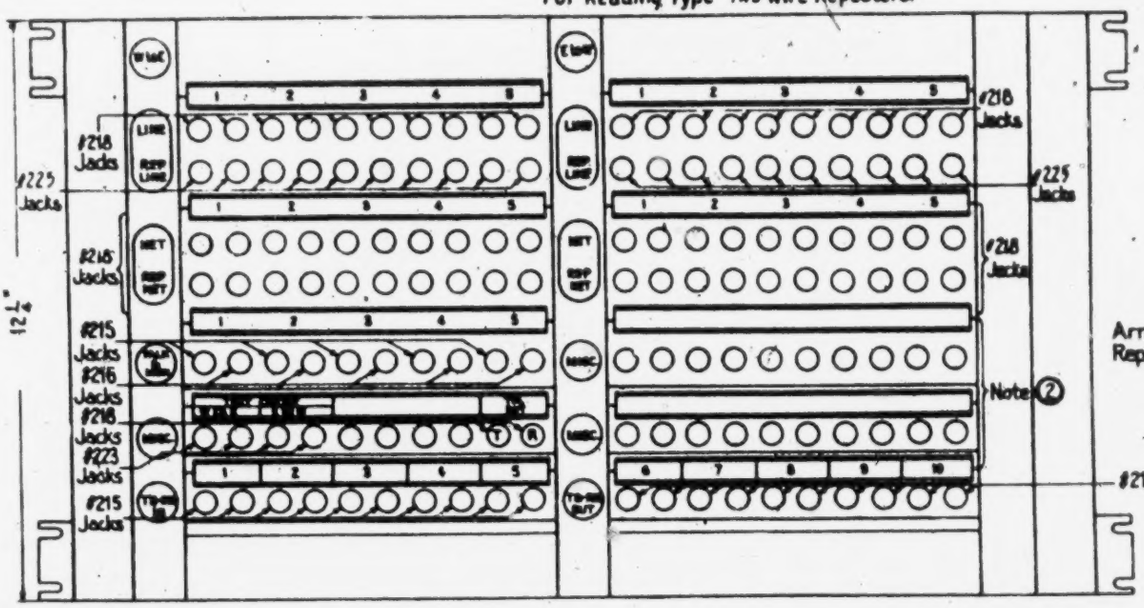


FIG. 1
Arrangement for Five Repeaters per Bay

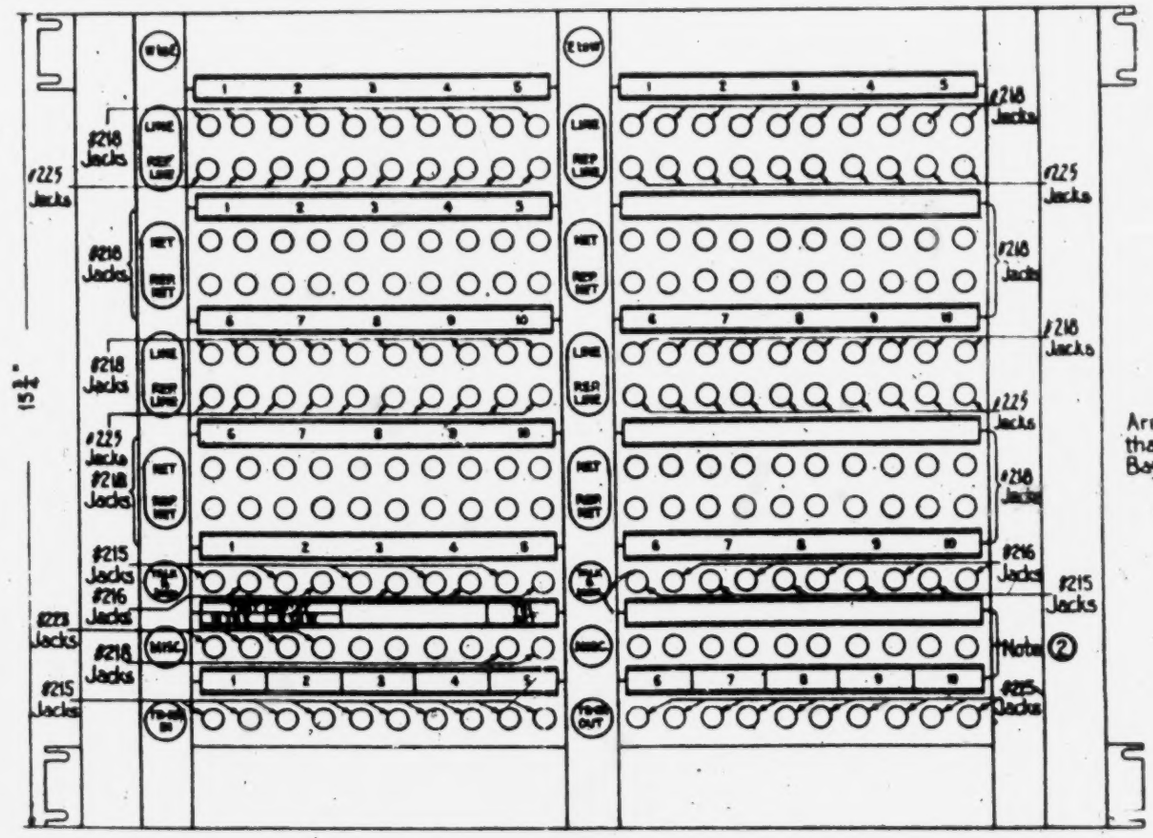


FIG. 2
Arrangement for more than Five Repeaters per Bay

NOTES

① Double Jack Mountings are #129; Single Jack Mountings are #128; Oval number plates are #127-A; Round number plates are #23-D; Designation strips are #8-K.

② When miscellaneous jacks in right hand panels are not required, substitute #60-A jack spaces for the #128 jack mounting

15537

9565

[fol. 15538] TOLL CASE—KOSITZKY EXHIBIT No. 26

A. U. R. P. No. 124

The Ohio Bell Telephone Company

Services rendered to The Ohio Bell Telephone Company by the General Staff of the American Telephone and Telegraph Company.

Summary of letters received by The Ohio Bell Telephone Company from the American Telephone and Telegraph Company, and telephone conversations between representatives of both companies.

Classification	Letters Received	Telephone Conversations
1. General	220	1
2. Fundamental Plans	12	5
3. Land and Buildings	30	
4. Commercial	269	60
5. Central Office Equipment	185	5
6. P. B. X. Equipment & Substations	134	1
7. Outside Plant	106	8
8. Transmission	180	37
9. Traffic	393	113
10. Motor Vehicles & Supplies	97	
11. Tools	31	1
12. Unification	29	1
13. First Aid	12	
14. Arrangements with other wire using companies	7	
15. Depreciation	3	
16. Inventories, Appraisals & Valuations	3	
17. Forms	9	3
Total	1720	235

86½% of the above letters is in connection with specific problems of The Ohio Bell Telephone Company. The remaining 13½% is general in nature, affecting several associated companies. All of the telephone conversations, of course, are in connection with specific problems of The Ohio Bell Telephone Company.

[fol. 15539] TOLL CASE—KOSITZKY EXHIBIT No. 28

A. U. R. P. No. 124

The Ohio Bell Telephone Co.

Services rendered to The Ohio Bell Telephone Company by the General Staff of The American Telephone and Telegraph Company.

Summary of special services rendered to The Ohio Bell Telephone Company by members of the General Staff of the American Telephone and Telegraph, involving trips to Ohio by the latter and trips to New York by members of The Ohio Bell Telephone Company organization.

Classification	Number of Services
1. General	37
2. Fundamental Plans	11
3. Land and Buildings	8
4. Commercial	168
5. Central Office Equipment	36
6. P. B. X. Equipment and Substations	19
7. Outside Plant	20
8. Transmission	58
9. Traffic	178
10. Motor Vehicles & Supplies	13
11. Tools	6
12. Unification	18
13. Depreciation	4
14. Inventories, Appraisals & Valuations	1
Total	577

97½% of the above services is in connection with specific problems of The Ohio Bell Telephone Company. The remaining 2½% is general in nature, affecting several associated companies.

[fol. 15540] TOLL CASE—KOSITZKY EXHIBIT No. 30

A. U. R. P. No. 124

The Ohio Bell Telephone Company

Services Rendered to the Ohio Bell Telephone Company by the General Staff of The American Telephone and Telegraph Company

Instrument Service

1. First Cost: Set of Instruments		$4.50
2. Annual Cost per Set of Instruments		21%
3. Average Number of Sets of Instruments per station		1.05
4. Annual Cost per station (except stock of instruments to ensure continuity of supply) 4.50 × 21% × 1.05=		$0.992
5. Stock of Instruments to Ensure Continuity of Supply = 6% additional per station = 6% of $4.50 =		$0.270
6. Annual Cost of Carrying this Stock 11%		
7. Annual Cost per station on those carried in Stock, = $0.270 × 11% =		$0.03
8. Total Annual Cost per Station		$1.022
9. Average number of sets of Instruments	519,622	
10. Number of stations (Dec. 31, 1923)	495,397	
11. Total First Cost Evaluation of the Instrument Service = 519,622 × 1.06 × 4.50=		$2,478,597
12. Total Annual Value of Instrument Service to The Ohio Bell Telephone Company — 495,397 × 1.022=		$506,296

[fol. 15541] TOLL CASE—KOSITZKY EXHIBIT No. 31

A. U. R. P. No. 124

The Ohio Bell Telephone Company

Estimated Savings for The Ohio Bell Telephone Company Due to Certain Items of Development Work Carried Out by The General Engineering Staff of The American Telephone and Telegraph Company

Exchange

Item	Saving in First Cost	Saving in Annual Charges
1. Fine Wire Cables (Excepting 900 pair, 22 gauge and all sizes 24 gauge cable) including ducts	$9,414,788	$1,554,148
2. 900 Pair 22 gauge, and all sizes 24 gauge cables, including ducts	1,323,699	198,208
3. Lead-Antimony Cable Sheath	271,100	38,368
4. Copper-Steel Twisted Pair Wire	1,208,670	374,688
5. Duplex Cable	31,121	4,886
6. Loading (Inter office trunks) including ducts	3,685,722	517,843
7. Machine ringing on "B" Boards	224,000	267,377
8. Prepay Coin Box Equipment		139,031
9. Improved Local Switchboard Cords		249,906
10. Improved Line and Cut-off Relays	125,028	27,882
11. Cheaper Contact Metal	370,080	68,465
Total	16,654,208	3,440,802

[fol. 15542] TOLL CASE—KOSITZKY EXHIBIT No. 32

A. U. R. P. No. 124

The Ohio Bell Telephone Company

Estimated Savings for The Ohio Bell Telephone Company Due to Certain Items of Development Work Carried Out by The General Engineering Staff of The American Telephone and Telegraph Company

Toll

Item	Saving in First Cost	Saving in Annual Charges
1. Lead Antimony Cable Sheath	$17,945	$2,473
2. Copper Steel Twisted Pair Wire	923	286
3. Duplex Cable	709,563	105,183
4. Loading (open wire and toll cables without repeatered circuits), including ducts	820,171	137,311
5. Open Wire Phantom Circuits	7,601,774	1,453,485
6. Repeaters	736,110	104,828
7. Single Ticket Method of Toll Operation	736,409	570,206
8. Overlap Ringing-in Toll Operation	149,297	58,458
9. Improved Toll Switchboard Cords		15,842
10. Improved Line and Cut-Off Relays	7,981	1,780
11. Cheaper Contact Metal	23,622	4,370
Total	10,803,795	2,454,222

[fol. 15543] TOLL CASE—KOSITZKY EXHIBIT No. 33

A. U. R. P. No. 124

The Ohio Bell Telephone Company

Estimated Savings for The Ohio Bell Telephone Company Due to Certain Items of Development Work Carried Out by the General Staff of the American Telephone and Telegraph Company and the Value of the Instrument Service to The Ohio Bell Telephone Company

Summary

Item	Saving in First Cost	Saving in Annual Charges
Exchange—Including Instrument Service	$19,132,805	$3,947,098
Toll	10,803,795	2,454,22
Total — Not including anything for legal, financial, accounting, use of patents, etc.	$29,936,600	$6,401,320

(Here follows 1 photo, side folio 15544)

ADVISO
AI

DEPARTMENT OF DEVELOPMENT AND RESEARCH

CONDUCTS DEVELOPMENT AND RESEARCH in connection with new systems, apparatus and materials for use in plants of Associated Companies.

This work is undertaken in advance of needs of Associated Companies, so that orderly expansion of their business will not be choked and they will not be obliged to enter upon use of untried systems, apparatus and materials.

Preventing errors by Associated Companies from use of improper apparatus, materials or practices.

Examining Current Technical literature of the World in search of useful new ideas.

Examination of Patents issued bearing, in any way, on art of telephony.

Investigating and Testing general scientific and engineering discoveries.

Recommends standards. Uniform practices contribute to economy in production and operation. Telephone plant is a constantly growing thing. Specifications, apparatus and methods must be frequently reviewed to see that they stand the test that each day applies to them. Standards must be dynamic, not static.

[illegible] the lines of development

LEGAL DEPARTMENT

EXPERT ADVICE as to all questions arising in connection with the business.

ADVANCE COMPILATION AND DISTRIBUTION OF REPORTS of all commission decisions.

BULLETIN OF COURT CASES of interest to Associated Company:- Compilation and distribution at regular intervals.

COLLECTION, ANALYSIS & DISTRIBUTION of INFORMATION of general interest and value to legal departments of Associated Companies.

PREPARATION & DISTRIBUTION OF COMPARATIVE COMPILATIONS of all statutes affecting telephone companies.

USE OF PATENTS

Large number of patents owned and controlled by A. T. & T. Co.

These patents cover system Associated Companies now use. Also methods to be used in future.

Groups of these patents cover matters of vital consequence in economy and efficiency of apparatus used by Associated Companies.

ACCOUNTIN

AUDITING ACCOUNTS OF Associated Company

ACCOUNTING STANDARDIZATION

DEVELOPING AND MAINTAINING UNIFORM ACCOUNTING SYSTEM

DEVISING FORMS AND ROUTINES of Clerical Procedure.

CONFERENCES with Interstate Commerce and other Commissions.

Development and [illegible] of statistical collection of [illegible]

Determines the lines of development work to meet the requirements, present and future, of the Bell System. Conducts and directs the development and research work covering the entire technical field of telephony.

DEVELOPMENT, RESEARCH AND STANDARDIZATION

APPARATUS

SUBSTATION EQUIPMENT

Desk Stands
Ringers
Cords
Wiring Arrangements.

INSTRUMENTS:

TRANSMITTERS, RECEIVERS, INDUCTION COILS

Improving the loudness and clearness.

SWITCHBOARDS AND EQUIPMENT

MANUAL

CIRCUITS AND APPARATUS

Local Switchboards and Equipment
Toll Switchboards and Equipment
Private Branch Exchanges
Power Supply
Test Boards
Desk Equipment
Maintenance Methods

MACHINE SWITCHING

CIRCUITS AND APPARATUS

Panel Machine Switching.
Improvement of existing machine switching systems for use in

OUTSIDE PLANT

Cables of all kinds including duplex cables.
Phantom circuits.
Poles, crossarms, other timber and preservatives.
Subway materials.
Pole line hardware.
Outside plant apparatus of all kinds.
Wire and strand.
Tools
Prevention of electrolysis.

TELEPHONE TRANSMISSION

Improving the loudness and clearness of telephone transmission.
Advanced scientific research applied to telephone art.
Telephone Repeaters.
Application of loading to cables and open wires.
Carrier and Radio systems.
Electrical protection.
Transmission measuring devices.

PREVENTION OF INTERFERENCE FROM ELECTRIC LIGHT, ELECTRIC RAILWAY & POWER LINES AND OTHER SOURCES.

Development of:
Transposition systems, Electrically balanced apparatus; Safe construction methods for crossings, parallels, and jointly used lines.

These patents cover system Associated Companies now use. Also methods to be used in future.

Groups of these patents cover matters of vital consequence in economy and efficiency of apparatus used by Associated Companies.

Several of these groups cover, broadly and in detail, apparatus, methods, systems and connections required in improving transmission of speech.

A large group covers ground we must traverse in prospective developments of switchboards.

A. T. & T. Co. patent department assumes burden of patent litigation and obtains adequate patent protection on new developments.

A. T. & T. Co. assumes responsibility for claims for infringement and all concern with patent matters of any kind.

Development and st
of statistical met
collection of stat
ing to telephone
and elsewhere.

PLANT ENGINEERING

In order that plants may be most economically designed, constructed and
Associated Companies are advised as to
types of construction best suited
different conditions and having
nace between investment and
costs.

Buildings:

This department prepares efficient and economical floor plans for buildings; participates in planning new buildings and extensions to existing buildings; advises as to desirable size and shape of land for specific building projects; advises as to fire prevention and protection and other building safety measures; al o regarding maintenance of buildings.

Central Office Engineering:

When additions to the plant are required it is often possible to provide the additional facilities by more than one plan of procedure. This Department is frequently called upon by Associated Companies to revise their studies made to determine the most economical plan and to make suggestions.

Prepares and issues to Associated
panies information covering best
of maintaining central office

DEVELOPMENT, RESEARCH AND STANDARDIZATION

A. T. & T. Co. patent department assumes burden of patent litigation and obtains adequate patent protection on new developments.

A. T. & T. Co. assumes responsibility for claims for infringement and all concern with patent matters of any kind.

APPARATUS

SUBSTATION EQUIPMENT

Desk Stands
Ringers
Cords
Wiring Arrangements.

INSTRUMENTS:

TRANSMITTERS, RECEIVERS, INDUCTION COILS

Improving the loudness and clearness.

SWITCHBOARDS AND EQUIPMENT

MANUAL

CIRCUITS AND APPARATUS

Local Switchboards and Equipment
Toll Switchboards and Equipment
Private Branch Exchanges
Power Supply
Test Boards
Desk Equipment
Maintenance Methods

MACHINE SWITCHING

CIRCUITS AND APPARATUS

Panel Machine Switching.
Improvement of existing machine switching systems for use in smaller places.
Machine switching in connection with manual offices.
Substation and private branch exchange arrangements for use with machine switching.
Maintenance methods.

OUTSIDE PLANT

Cables of all kinds including duplex cables.
Phantom circuits.
Poles, crossarms, other timber and preservatives.
Subway materials.
Pole line hardware.
Outside plant apparatus of all kinds.
Wire and strand.
Tools
Prevention of electrolysis.

TELEPHONE TRANSMISSION

Improving the loudness and clearness of telephone transmission.
Advanced scientific research applied to telephone art.
Telephone Repeaters.
Application of loading to cables and open wires.
Carrier and Radio systems.
Electrical protection.
Transmission measuring devices.

PREVENTION OF INTERFERENCE FROM ELECTRIC LIGHT, ELECTRIC RAILWAY & POWER LINES AND OTHER SOURCES.

Development of:
Transposition systems, Electrically balanced apparatus; Safe construction methods for crossings, parallels, and jointly used lines.

PLANT ENGINEERING

In order that plants may be most economically designed, constructed and maintained Associated Companies are advised as to types of construction best suited to different conditions and having best balance between investment and maintenance costs.

Buildings:

This department prepares efficient and economical floor plans for buildings; participates in planning new buildings and extensions to existing buildings; advises as to desirable size and shape of land for specific building projects; advises as to fire prevention and protection and other building safety measures; also regarding maintenance of buildings.

Central Office Engineering:

When additions to the plant are required it is often possible to provide the additional facilities by more than one plan of procedure. This Department is frequently called upon by Associated Companies to review their studies made to determine the most economical plan and to make suggestions.

Prepares and issues to Associated Companies information covering best methods of maintaining central office equipment.

Substation Engineering:

Associated Companies are furnished latest and best information as to design, installation and maintenance of substation and private branch exchange circuits and as to installation and maintenance practices for substation equipment.

Methods for making fundamental development studies based on surveys, and assistance in

TOLL CASE RHODES EXHIBIT 3

TABULAR VIEW OF LICENSE CONTRACT SERVICES

ADVISORY, CONSULTING, FINANCIAL AND GENERAL SERVICES

ACCOUNTING DEPARTMENT

- AUDITING ACCOUNTS OF Associated Company
- VISITS to Associated Company GIVING ADVICE on Accounting Matters.
- ACCOUNTING STANDARDIZATION
- DEVELOPING AND MAINTAINING UNIFORM ACCOUNTING SYSTEM
- DEVISING FORMS AND ROUTINES of Clerical Procedure.
- CONFERENCES with Interstate Commerce and other Commissions.
- STATISTICAL ADVICE
- Studies of financial and general business conditions for benefit of Associated Companies.
- Cooperating with and assisting Associated Companies in statistical work and studies of expected future operating results.
- Actuarial studies involving subjects such as insurance matters, pension plans, etc.
- Development and standardization of statistical methods, and collection of statistics pertaining to telephone business in U.S. and elsewhere.

EXECUTIVE DEPARTMENT AND TREASURER'S DEPARTMENT

Assistance in Raising Funds for Plant Extensions as per Budget:

(a) Loaning money at ordinary rates of interest.
(b) Taking stock without discount.
(c) Assisting in sale of securities

- STUDIES AND ADVISES Associated Companies on PLANT, TRAFFIC and COMMERCIAL problems Effecting the construction, operation and development of their telephone systems.
- DETERMINES MOST EFFECTIVE METHODS for Associated Companies: Studies and compares their results. Recommends improvements in service, economies and better arrangements of working organizations to meet conditions in the field.
- Specifications, Handbooks and Circular Letters
- FURNISHES to Associated Companies CONSULTING ENGINEERING ADVICE on unusual or difficult or exceptionally large engineering questions.
- SPECIFIC WORK DONE FOR EACH ASSOCIATED COMPANY
- Large amount of work done by General Engineering Staff in advisory capacity on Specific Engineering questions. The engineers of the Associated Companies call upon the General Engineering Staff for specific advice and assistance whenever in their opinion they require it.

DEPARTMENT OF OPERATION AND ENGINEERING

- Advises Managing Officials of Associated Companies on Operating and Engineering features of telephone business to secure most satisfactory service to Public and greatest economy of operation.

...with Inter-...ate Commerce and other ...missions.

Actuarial studies involving subjects such as insurance matters, pension plans, etc.

Specifications, Handbooks and Circular Letters

General Engineering Staff for specific advice and assistances whenever in their opinion they require it.

Development and standardization of statistical methods, and collection of statistics pertaining to telephone business in U.S. and elsewhere.

PLANT

TRAFFIC ARRANGEMENTS

Simple, effective and economical.

TRAFFIC

Best methods of handling all classes of calls.
Most effective and economical handling of traffic work.
Best ways of giving efficient and economical service to meet the needs of the Public.
Standard traffic engineering and operating bulletins prepared and furnished to Associated Companies.
Service and traffic work of all Associated Companies carefully studied.
Advice given to Associated Companies on special traffic problems and difficulties.

PLANT ENGINEERING

PLANT OPERATION

...hat plants may be most economic-...gned, constructed and maintained. ...d Companies are advised as to ...construction best suited to meet ... conditions and having best bal-...een investment and maintenance

Outside Plant:

Illustrated handbooks are prepared giving plant forces detailed information as to best construction and maintenance practices to follow in all portions of outside plant including conduits, underground cables, aerial cables, pole lines and wire plant.

Associated Companies furnished information as to most approved methods of making engineering cost comparisons to determine most economical types and sizes of outside plant to install under various conditions as to expected future rate of growth.

Development work to make available to Associated Companies labor saving machines for use in outside plant construction work, such as pole hole diggers, pole derricks, etc.

Plant Practices and Results

Development of most effective methods of planning and executing construction and maintenance work.

Study and analysis of construction and maintenance practices and results; study of force requirements.

Operating Practices and Results

Providing Associated Companies with operating routines and records best adapted to secure efficiency in methods of plant operation.

Accident Prevention

Analysis of accident reports of Associated Companies enables causes of accidents to be eliminated in design of plant and methods of working, thereby reducing accidents to a minimum.

Assistance to Associated Companies in preparation of Employees' Safety Codes.

LOCAL:

Type, quantity and arrangement of equipment to render best and most economical local exchange service.

Conducting investigations and trials of new apparatus and methods designed to improve service or render it at lower cost.

Preparing for Associated Companies descriptions of best methods and practices to be employed by operating forces.

Developing traffic engineering methods used by Associated Companies for determining proper amounts and arrangements of local switchboard equipment under different conditions.

Developing fundamental traffic engineering records to provide data necessary for engineering buildings, switchboards and arrangement of the operating forces.

TOLL:

Type, quantity and arrangement of switchboard equipment for toll offices; quantity and arrangement of toll line circuit facilities and best toll operating methods and practices.

Developing traffic engineering methods used by Associated Companies for determining proper amounts and arrangements of toll switchboard equipment under different conditions.

Developing fundamental traffic engineering records to provide data necessary for estimating future toll equipment and toll circuit requirements.

Determining basic toll circuit loads and most economical arrangements for use in toll line engineering work.

Conducting investigations and trials of new apparatus and methods designed to improve toll service or to render it at lower cost through more

GENERAL TRAFFIC PROBLEMS:

Development of methods for making fundamental plans for toll plants and assistance to Associated Companies in making such plans.

Development of toll rate quoting and rate computing methods and means to enable toll operators to determine correct charges on toll calls with least delay and effort.

PLANT

PLANT ENGINEERING

...der that plants may be most economic-
...designed, constructed and maintained.
...iated Companies are advised as to
...e of construction best suited to meet
...erent conditions and having best bal-
...between investment and maintenance
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...ent and
...ildings;
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...d Com-
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...latest
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...tation
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... prac-

...or making fundamental plans and
...nt studies based on commercial
... and assistance in specific plans.

Outside Plant:

Illustrated handbooks are prepared giving plant forces detailed information as to best construction and maintenance practices to follow in all portions of outside plant including conduits, underground cables, aerial cables, pole lines and wire plant.

Associated Companies furnished information as to most approved methods of making engineering cost comparisons to determine most economical types and sizes of outside plant to install under various conditions as to expected future rate of growth.

Development work to make available to Associated Companies labor saving machines for use in outside plant construction work, such as pole hole diggers, pole derricks, etc.

Transmission & Protection

Consulting advice on specific transmission matters; apparatus and methods for use in maintaining high grade transmission; methods and apparatus for electrical protection of telephone plant against hazards from power and lighting currents; best methods for minimizing interference with telephone transmission from induced currents from neighboring foreign circuits.

PLANT OPERATION

Plant Practices and Results

Development of most effective methods of planning and executing construction and maintenance work.

Study and analysis of construction and maintenance practices and results; study of force requirements.

Operating Practices and Results

Providing Associated Companies with operating routines and records best adapted to secure efficiency in methods of plant operation.

Accident Prevention

Analysis of accident reports of Associated Companies enables causes of accidents to be eliminated in design of plant and methods of working, thereby reducing accidents to a minimum.

Assistance to Associated Companies in preparation of Employees' Safety Codes.

Most effective methods of training employees in First Aid Work.

Requirements for First Aid Equipment.

...

Simple, effective and economical.

TRAFFIC

Best methods of handling all classes of calls.
Most effective and economical handling of traffic work.
Best ways of giving efficient and economical service to meet the needs of the Public.
Standard traffic engineering and operating bulletins prepared and furnished to Associated Companies.
Service and traffic work of all Associated Companies carefully studied.
Advice given to Associated Companies on special traffic problems and difficulties.

LOCAL:

Type, quantity and arrangement of equipment to render best and most economical local exchange service.

Conducting investigations and trials of new apparatus and methods designed to improve service or render it at lower cost.

Preparing for Associated Companies descriptions of best methods and practices to be employed by operating forces.

Developing traffic engineering methods used by Associated Companies for determining proper amounts and arrangements of local switchboard equipment under different conditions.

Developing fundamental traffic engineering records to provide data necessary for engineering buildings, switchboards and arrangement of the operating forces.

Developing best methods for engineering trunk layouts and equipments.

Type, arrangement and amount of information desk and other special equipment.

Operating problems arising in connection with cut-overs.

TOLL:

Type, quantity and arrangement of switchboard equipment for toll offices; quantity and arrangement of toll line circuit facilities and best toll operating methods and practices.

Developing traffic engineering methods used by Associated Companies for determining proper amounts and arrangements of toll switchboard equipment under different conditions.

Developing fundamental traffic engineering records to provide data necessary for estimating future toll equipment and toll circuit requirements.

Determining basic toll circuit loads and most economical arrangements for use in toll line engineering work.

Conducting investigations and trials of new apparatus and methods designed to improve toll service or to render it at lower cost through more efficient operating and more efficient use of the expensive toll plant.

Preparing for Associated Companies standard toll operating methods, and continuous work developing improved methods.

GENERAL TRAFFIC PROBLEMS

Development of methods for ...
...ing fundamental plans for ...
...plants and assistance to As...
...ciated Companies in making ...
...plans.

Development of toll rate quo...
...ing and rate computing meth...
...and means to enable toll op...
...ators to determine correct ...
...charges on toll calls with ...
...least delay and effort.

DEPARTMENT OF OPERATION AND ENGINEERING

Advises Managing Officials of Associated Companies on Operating and Engineering features of telephone business to secure most satisfactory service to Public and greatest economy of operation.

ADVISES ASSOCIATED COMPANIES regarding most effective methods of applying work of Department of Development and Research.

INSURANCE PROBLEMS.

- Standard Forms of Fire Insurance Policies.
- Buildings
  - Standard Types to Promote Safety and Reduce Fire Risk
  - Standards for Inspection and Maintenance.
  - Periodic Inspection of Buildings
- Rates and Adjustment of Losses.

TRAFFIC ARRANGEMENTS

Simple, effective and economical.

INFORMATION AND PUBLICITY DEPARTMENT

- Conducts National Advertising.
- Assists Associated Companies in their advertising.
  - Places advertising and publicity specialists at service of Associated Companies as required.

CONSISTING OF FU
ALL OF THE TRANS
COILS USED THERE
COMPANY FOR CIVI
PAIRING AND MAIN

Whenever a general improvement is made and a new type of instrument is brought out, the ASSOCIATED COMPANY can RETURN the INSTRUMENT OF THE OLDER TYPE and, without additional charge, OBTAIN INSTRUMENT OF THE LATEST TYPE.

Whenever the ASSOCIATED COMPANY returns an instrument for any injury whatsoever experienced as the result of its use it can OBTAIN A PERFECT INSTRUMENT IN EXCHANGE FOR IT: thus the Associated Company is relieved of the burden of repairing or replacing injured instruments.

COMMERCIAL

...FFIC ARRANGEMENTS

...le, effective and economical.

TRAFFIC

...handling all classes of calls. ...and economical handling of

...ving efficient and economical ...t the needs of the Public. ...c engineering and operating ...ared and furnished to Associated

...ffic work of all Associated ...fully studied. ... Associated Companies on special ...ms and difficulties.

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GENERAL TRAFFIC PROBLEMS:

Development of methods for making fundamental plans for toll plants and assistance to Associated Companies in making such plans.

Development of toll rate quoting and rate computing methods and means to enable toll operators to determine correct charges on toll calls with least delay and effort.

TRAFFIC RESULTS:

Development of means for measuring the quality and efficiency of traffic performance and of methods of traffic management and administration for securing best performance.

Equipment, methods and forms for observing both local and toll service.

Methods and forms for counting and recording the volume of traffic handled; for equating all classes of calls to a common work unit basis and for summarizing in useful form the data thus secured.

Continuous study of switchboard operation, both local and toll, as it is being carried on in the field, to determine and develop best operating technique for making effective the standardized operating practices.

Continuous study of all problems of central office management, such as are involved in the training and supervision of the operating forces, force adjustment work, etc.

COMMERCIAL

COMMERCIAL ADMINISTRATIVE PROBLEMS

COMMERCIAL ENGINEERING

COMMERCIAL METHODS AND RESULTS

Study and analysis of all phases of commercial administration and management with a view to assisting the Associated Companies in the establishment of the most effective organization and methods for rendering to the Public the most satisfactory and economical service.

Study and development of best forms of organization and equipment of business offices and most efficient routines for administration of business office work.

Studies and tests of business office supplies and appliances of every description, and standardization of types that best meet requirements of Associated Companies.

SALES METHODS

Study and analysis of the telephone service from the public viewpoint with the purpose of determining the most effective ways and means by which the Associated Companies may serve the interests of telephone users in all lines of business.

Studies of the various uses and applications of telephone service in order to determine and develop the most efficient methods and practices for its systematic and economic employment.

Associated Companies are furnished with information as to the best methods of analyzing service requirements of individual subscribers for the purpose of ascertaining what measures may be taken to increase the utility and efficiency of subscriber's telephone service.

DIRECTORY METHODS.

Study and analysis of directory problems with a view to assisting the Associated Companies in producing directories which shall be of the greatest possible use to the Public, taking advantage of all possible economies in production and distribution.

Studies are carried on relating to the scope and areas to be covered by directories, and to their frequency of issue.

Studies are made of methods of compilation, type styles, methods of listing, book specifications and delivery methods.

FORECASTING THE FUTURE

Associated Companies are furnished with the latest information as to the best methods of making Commercial Surveys to develop the telephone market and to determine the probable extent and direction of the growth of telephone service in order that plans may be made for adequate and economical extension of the plant.

Associated Companies are assisted in the making of specific commercial surveys.

RATE

Telephone rate ...ly studied wi... ...sisting the A... ...ies in the de... widest practi... telephone ser... ...lic, with the... the necessary...

Information f... as to rates ... ...tices is coll... ...lyzed, and s... ...mation are f... Associated C... matters.

Development ... of the Asso... of the funda... and princip... ...ing and of ... ...ing this in...

INSTRUMENT SERVICES

INFORMATION AND PUBLICITY DEPARTMENT

- Conducts National Advertising.
- Assists Associated Companies in their advertising.
  - Places advertising and publicity specialists at service of Associated Companies as required.

- ADVISES ASSOCIATED COMPANIES regarding most effective methods of applying work of Department of Development and Research.
- INSURANCE PROBLEMS.
  - Standard Forms of Fire Insurance Policies.
  - Buildings
    - Standard Types to Promote Safety and Reduce Fire Risk
    - Standards for Inspection and Maintenance.
    - Periodic Inspection of Buildings
  - Rates and Adjustment of Losses.

CONSISTING OF FURNISHING TO THE ASSOCIATED COMPANY ALL OF THE TRANSMITTERS, RECEIVERS AND INDUCTION COILS USED THEREWITH, REQUIRED BY THE ASSOCIATED COMPANY FOR GIVING TELEPHONE SERVICE, AND ALSO REPAIRING AND MAINTAINING THESE INSTRUMENTS.

- Whenever a general improvement is made and a new type of instrument is brought out, the ASSOCIATED COMPANY can RETURN the INSTRUMENTS OF THE OLDER TYPE and, without additional charge, OBTAIN INSTRUMENTS OF THE LATEST TYPE.
- CARRYING AN ADEQUATE RESERVE STOCK of instruments to assure Associated Company of uninterrupted supply.
- Whenever the ASSOCIATED COMPANY returns an instrument for any injury whatsoever experienced as the result of its use it can OBTAIN A PERFECT INSTRUMENT IN EX-
- The ASSOCIATED COMPANY is relieved from the

Whenever the ASSOCIATED COMPANY returns an instrument for any injury whatsoever experienced as the result of its use it can OBTAIN A PERFECT INSTRUMENT IN EXCHANGE FOR IT: thus the Associated Company is relieved of the burden of repairing or replacing injured instruments.

The ASSOCIATED COMPANY is relieved from the NECESSITY OF HAVING ANY CAPITAL INVESTED IN transmitters, receivers or their associated induction coils.

COMMERCIAL

COMMERCIAL ADMINISTRATIVE PROBLEMS

COMMERCIAL ENGINEERING

TRAFFIC PROBLEMS:

of methods for making plans for toll assistance to Associates in making such

of toll rate quot- computing methods to enable toll operdetermine correct toll calls with and effort.

TRAFFIC RESULTS:

Development of means for measuring the quality and efficiency of traffic performance and of methods of traffic management and administration for securing best performance.

Equipment, methods and forms for observing both local and toll service.

Methods and forms for counting and recording the volume of traffic handled; for equating all classes of calls to a common work unit basis and for summarizing in useful form the data thus secured.

Continuous study of switchboard operation, both local and toll, as it is being carried on in the field, to determine and develop best operating technique for making effective the standardized operating practices.

Continuous study of all problems of central office management, such as are involved

COMMERCIAL METHODS AND RESULTS

Study and analysis of all phases of commercial administration and management with a view to assisting the Associated Companies in the establishment of the most effective organization and methods for rendering to the Public the most satisfactory and economical service.

Study and development of best forms of organization and equipment of business offices and most efficient routines for administration of business office work.

Studies and tests of business office supplies and appliances of every description, and standardization of types that best meet requirements of Associated Companies.

SALES METHODS

Study and analysis of the telephone service from the public viewpoint with the purpose of determining the most effective ways and means by which the Associated Companies may serve the interests of telephone users in all lines of business.

Studies of the various uses and applications of telephone service in order to determine and develop the most efficient methods and practices for its systematic and economic employment.

Associated Companies are furnished with information as to the best methods of analyzing service requirements of individual subscribers for the purpose of ascertaining what measures may be taken to increase the utility and efficiency of subscriber's telephone service.

DIRECTORY METHODS.

Study and analysis of directory problems with a view to assisting the Associated Companies in producing directories which shall be of the greatest possible use to the Public, taking advantage of all possible economies in production and distribution.

Studies are carried on relating to the scope and areas to be covered by directories, and to their frequency of issue.

Studies are made of methods of compilation, type styles, methods of listing, book specifications and delivery methods.

FORECASTING THE FUTURE

Associated Companies are furnished with the latest information as to the best methods of making Commercial Surveys to develop the telephone market and to determine the probable extent and direction of the growth of telephone service in order that plans may be made for adequate and economical extension of the plant.

Associated Companies are assisted in the making of specific commercial surveys.

RATE STUDIES

Telephone rates are constantly studied with a view to assisting the Associated Companies in the development of the widest practicable use of the telephone service by the Public, with the production of the necessary revenues.

Information from all sources as to rates and rate practices is collected and analyzed, and advice and information are furnished to the Associated Companies on these matters.

Development for the benefit of the Associated Companies of the fundamental facts and principles of rate making and of methods for applying this information.

[fol. 15545] TOLL CASE—RHODES EXHIBIT 83

What it Would Cost Ohio Bell Telephone Company in State of Ohio to Provide Its Own Instruments

(1)	First Cost: Set of Instruments	~~$4.50~~	
(2)	Annual cost per set of instruments:		
(3)	8% Return on Investment		$.360
(4)	7% Credit to the Account "Reserve for Accrued Depreciation"		.315
(5)	Repairs		.090
(6)	1% Cost of Administration		.045
(7)	2% Reserve for Contingencies		.090
(8)	Sub-Total		$.900
(9)	Average Number of Sets per Station		1.05
(10)	Annual Cost per Station (except Stock of Instruments to Ensure Continuity of Supply) $.900 × 1.05		$.945
(11)	Stock of Instruments to Ensure Continuity of Supply:		
(12)	Proportion of Instruments in Stock	6%	
(13)	6% of $4.50 = $.270		
(14)	Annual Cost of Carrying this Stock:		
(15)	Return on Investment	8%	
(16)	Cost of Administration	1%	
(17)	Insurance and Contingencies	2%	
(18)		11%	
(19)	11% of $.270		.030
(20)	Total Annual Cost per Station		$.975

[fol. 15546] TOLL CASE—RHODES EXHIBIT 84

Titles of Some of the Circular Letters and Specifications That Have Been Prepared for the Associated Companies

Circular Letters:

The "Center Checking" System.
Location of Connector Block used with Hollow Arm.
Private Branch Exchange No. 1—Changes in Operator's Circuit.

Circular Letters—Continued

Alarm Fuses.
Toll Line Construction—Placing Circuits to Admit of Phantoming.
Small Tool Box.
Glass Insulators.
No. 25 Repeating Coil.
Wiring of Desk Stands.
Cable Plans for Small Cities.
No. 14 Cable Terminal.
Galvanized Steel Strand.
Private Branch Exchange No. 2.
No. 10 Switchboard.
Preservative Treatment of Poles.
Iron Wire.
Wiring of Telephone Switchboard Lighting Circuits.
Cable Records.
Height of Wall Sets.
Slotted Lamp Socket Mountings.
Reversing Plugs.
Dry Batteries.
Modifications in No. 17-A Test Set.
[fol. 15547] New Terminal Marking for Toroidal Repeating Coils.
Rural Line Subscribers' Set.
Arrangement of Keyboard Lamp Caps, Guards and Cords.
No. 17 Cable Terminals.
Color Scheme for Desk Stand Cords.
Joints in Iron Wire.
Test for Desk Stand Cord Connections.
Mine Telephones.
Comparative Economies in the Use of Gas and Electricity for Charging Batteries in Telephone Exchanges.
Central Office Building Plans.
Method of Adding Plates to Storage Batteries.
High Resistance Transmitters on Local Battery Lines.
Abandonment of No. 14-A (10 Pair) Cable Terminal.
Use of Lock Nuts in No. 14 Cable Terminals.
Switchboard Lighting.
Fahnestock Test Connector.
Measuring Instrument—Evershed Megger.

Circular Letters—Continued

Modifications in Standard Magneto Subscribers' Sets.

No. 20 Instrument Wire.

Signal Plugs.

Transmission Efficiency of Copper-Steel Outside Distributing Wire.

Tool for Cleaning Switchboard Jacks—No. 8 Switchboards.

Emergency Call Circuits and Emergency Local Ringdown Trunks.

New Toll Switchboard Cord Circuits.

[fol. 15548] No. 11 and No. 12 Protector Micas.

Composite Set Rack.

No. 49 Type Alarm Fuses.

Vogel Ground Clamps.

New Types of Call Wire Trunk Circuits.

Improved Two-Conductor Switchboard Cord.

Toll Switchboard Lighting.

Tool for Grooving Multiple Jacks.

Auxiliary Night Alarm Circuit for Small Offices.

Small Magneto Switchboards.

Standard Traffic Engineering Methods for Use in Connection with Building Plans.

Information on Loading.

Extra Glass Jars for Storage Battery Equipments.

Switchboard Platforms and Operators' Chairs.

Portable Composite Sets.

Phantoming of Rural Subscribers' Lines.

Color Scheme for Ringing Key Buttons and Plug Shells with Mechanically Locking Key Trunks.

Reversite Circuit Breakers for No. 1 Power Plants.

A: Most Economical Sizes of Cable to Install Underground.

B: Provision of Stubs for Branch from Large Cables.

Redesign of No. 103 Plug.

Jack Spring Adjusting Tools.

Standard Lengths for Operators' Telephone Cords.

Modified Nos. 35, 36, 37 and 51 Terminal Strips.

Color of Cords and Shells for Test and Plugging Up Lines.

[fol. 15549] Proposed New Type of Prepayment Multi-Coin Box.

Circular Letters—Continued

Blackburn Ground Clamp with Copper Shoe Attached to Band.

Automatic Switch for Electrolysis Drainage Wires.

Antimony Alloy Sheath for Underground Cables.

All Metal Flush Type Hotel Sets.

Strain Insulators.

Use of Repeating Coils in Toll Cord Circuits for Reducing Noise on Through Toll Connections.

Answering Jack Number Plates with Engraved Special Designations.

Porcelain Knobs.

Underground Conduit—Duct Requirements on Fundamental Plans.

Metal Subscribers' Sets.

Gauge for Testing Individual Dry Cells in Talking and Ringing Batteries.

Transmission Equivalents.

No. 250 Transmitter with Steel Arm.

Standard Switchboard and Circuit Drawings.

Substation Switching Keys.

Loading of Telephone Circuits.

Pole Relays, Code No. 191-A.

Materials for Aerial Loading Coil Construction.

Subscriber's Station Installation—Line and Ground Wire Holes.

Maintenance of Transmitter Batteries at Isolated Telephone Stations.

Jack for Portable Telephones.

Number Plates for Stile Casings—Nos. 107-B and 23-C.

[fol. 15550] Rural Lines—Central Office Equipment and Method of Operating.

"A" and "B" Supervisors' Equipment.

Standardization of 2-½ foot Length for Receiver Cords Used with Desk Stands.

Relay Switchboard No. 10—Provision of Extra Panel of Multiple at the End of the Board.

Method of Increasing "B" Operating Efficiency During Hours of Light Traffic.

Redesigned No. 7 Coin Collector.

Material Used in Exchange Aerial Construction.

Prevention of Electrolytic Corrosion in Prepayment No. 7 Coin Collector Coils.

Circular Letters—Continued

Testing Cabinet for Magneto and Small Common Battery Offices.

Rubber Faced Answering Jack Number Plates.

Wiring of Large Buildings for Telephone Service.

Circuit for Grouping "A" and "B" Positions.

Rules for Resuscitation from Electric Shock.

No. 128 Receivers With and Without Head Bands.

Method of Making Fundamental Plans.

Modified Nos. 38, 39 and 40 Terminal Strips.

Metal Battery Box for Subscribers' Stations.

Method of Wiring Condensers in Toll Cord Circuits.

New Type Transmitter Arms.

Improvement in Blue Bell Dry Battery.

Changes in No. 317 Type Subscribers' Sets.

No. 4 Private Branch Exchange.

Transmitters for Metal Subscribers' Sets.

Changes in No. 17 Cable Terminals.

[fol. 15551] Improved Cord Hole Eyelet for Desk Stand Bases.

Circuit for Grouping "A" and Toll Switching Positions.

Improved Terminal Rack for Desk Stands and Transmitter Arms.

Connecting Block with Soldering Lugs.

Changes in Equipment and Arrangement of No. 1 Trunk Switchboard Keyshelves.

Changes in Nos. 5 and 23 Induction Coils.

Improved Ringer for Common Battery Four-Party Selective Ringing Service.

Phantoming of Rural Subscriber's Lines—No. 1 Retardation Coil Box.

Antimony Alloy Sheath for Aerial Cables.

New Design of the No. 65 Terminal Strip for Horizontal Side of Main Distributing Frames.

Method of Handling Toll Calls from New Type Prepayment Multi-Coin Boxes.

Metal Block Protected Cable Terminal.

Standardization of Black Finish for Ringer Gongs and Clapper Guards.

Wiring of the Outgoing Trunk Multiple Directly to the Main Frame and Intermediate Type Terminal Strip for the Main Distributing Frame.

Circular Letters—Continued

Auxiliary Framing on Terminal Room Ceilings for the Support of Frames, Cable Racks, etc.

Ventilating System for Telephone Booths.

Reporting Defective Material.

Requirements for 25-foot Class "C" Cedar Poles.

New Standard Central Office Message Register—Lockup Type.

Tool for Removing Worn No. 49 Jack Sleeves.

Brush Treatment for Poles.

[fol. 15552] Direct Current Commutating Pole Motors for Charging Generators.

Insulation of Metal Subscriber's Equipment from Metal Walls.

New Phantom Circuit Repeating Coil—Code No. 46-A, Discontinuance of Manufacture of Nos. 25-AA, 37-A, 37-B and 38-B Repeating Coils.

Rubber Covered Plug Shelves.

Improved Worsted Receiver Cords.

New Unit Type Protector Mounting for Main Distributing Frames.

Battery Boxes for Dry Cells—Use of Dry Cells for Morse Local Battery and Transmitter Local Battery.

Rope Containing Metallic Strands.

Supplying Ringing Current over Cable Pairs to Private Branch Exchanges.

One Point Transposition Brackets and Steel Pins for Transposition Brackets.

Standard Drop Light Handle and Guard for Use in Operating and Terminal Rooms.

Folding Door Booth.

No. 50 Type Prepayment Multi-Coin Collector.

Cable Terminal for Use in Buildings—Standarization of No. 22 Cable Terminal and Nos. 1, 2 and 3 Fanning Strips.

Transmission Data.

Power Plant Wiring—Omission of Individual Cell Voltmeter Leads to Storage Batteries.

Pick-up Alarm Circuit—Machine Ringing.

Improved Types "A" and "B" Composite Ringers.

Repair of Tinsel Switchboard Cords.

High Impedance Relay for Use in New Toll Cord Circuits.

Circular Letters—Continued

Testing Circuit for Use in Connection with New Toll Cord Circuits.

[fol. 15553] All Metal Telephone Booths.

New Type Line and Cut-off Relay.

Separation of Aerial Cable Strand Ground and Protector Ground at Underground Cable Terminals.

Street Railway Telephone Set No. 278.

Omission of Subscribers' Multiple from "A" Switchboards—Multiple Answering Jacks and Lamps.

Maximum Cable Lengths.

Concrete Steel Reinforcement for Poles.

Marking of Defective Pairs in Lead Covered Cable.

Alarm Signal for Main Discharge Fuse.

Automatic Keyshelf Brace.

Moistureproof Switchboard Cable.

Improved Two-Conductor Tinsel Switchboard Cord, Improved Test and Morse Board Cords and Service Observing Cords.

Clearance of Telephone Wires, Cables and Guys at Highway Crossings.

(a) Joint Use of Poles.

(b) High Tension Crossings.

Standard Relay Rack.

Standard Floor Plan Arrangements for Telephone Buildings in Single-Office Districts.

Enameled Distributing Frame Wire.

Copper Block Cutout for No. 8 Type Protector.

Transmittal of "Examples Illustrating the Use of the Bulletin on Transmission Equivalents" and Printed Copy of "Supplement No. 1 to Bulletin on Transmission Equivalents."

Railroad Private Branch Exchange Equipment.

New Type Supervisory Relay.

Oil Insulators and Pedestal Supports for Mounting Storage Batteries.

[fol. 15554] Starters for Alternating Current Motors.

No. 5-L Type Message Register.

Standard Armature Air Gaps for Substation Ringers.

Local and Toll Service Observing Equipments.

Standard Message Register Racks and Casings.

Cincinnati Clips.

Circular Letters—Continued

Abandonment of High Resistance Heat Coils.
Standardization of Spring Terminals and No. 540 Cord for Connection of Blue Bell Dry Batteries.
Improved Loud Ringing Extension Bell Sets.
Receiver Cords—Covering for Tips.
No. 29-A Binding Post—Auxiliary Binding Post for Nos. 14 and 8 Cable Terminals.
Routine and Equipment for Handling Trouble Reports and Certain Associated Work.
Recovery of Substation Equipment.
Effect of Metal Prices on Cable Changes.
Waterproof Desk Stand Cords.
Primary Battery for Current Supply for Magneto Switchboards.
Nut Fit for Bolts Having a Short Length of Thread.
Magneto Switchboards No. 105-A and No. 105-B.
Markings Upon Bar and Cake Solder.
Handling Carbon Protector Blocks and Micas.
Telephone Connections for Trains at Stations.
Standard Lengths for Receiver and Desk Stand Cords.
Sleet Storm Data.
Redesigned 3 by 7 Cordless Private Branch Exchange.
Improvements in Design of Central Office Heat Coil.
[fol. 15555] Maintenance of Main Frame Heat Coils and Protector Springs.
Private Branch Exchange Switchboard No. 550-A.
Improved Calculagraph.
Sleeve Joints in Copper Line Wire.
Lubrication of No. 1-A Electric Clocks.
No. 1 Residence System.
Data for Determining the Proper Size of Central Office Storage Batteries.
New Type Metal Subscribers' Set.
Mechanically and Electrically Operated Peg Count Apparatus.
Guy Shield Plugs.
Duplex Cable.
Capacity of Paper Insulated Cable—Proposed Change in Method of Measuring.
Toll Test Board No. 4.

Circular Letters—Continued
Switchboard Clocks for Use at "A" Positions.
Standardization of Outside Plant Practices—Placing Underground Cable and Splicing Lead Covered Paper Insulated Cables.
Change in Manganese Used for Dry Cell Manufacture.
Cable Fault Locating Set—Exploring Coil Type.
Method of Placing Aerial Cable Rings.
Cable Paper.
Use of Superimposed Current for Operation of Selective Four-Party Bells.
Change in Distinguishing Colors on Individual Conductors of Switchboard Cords.
Change in Color Code for Distributing Frame Wire.
Testing Circuit for Toll Line Busy Signals.
New Method of Connecting Four-Party Selective Extension Bells.
[fol. 15556] Exposed Cables Entering Central Office and Subscribers' Buildings.
Transmission Measuring Set.
Resurfacing and Reengraving Call Circuit Key Buttons.
Designation Strips.
Large Gauge Cable.
Type "C" Porcelain Knob.
Switches for Duplex Sets.
Automatic Water-Fillers for Storage Batteries.
Tool for Operating "A" Type Cut-Off Relays Previous to Cutover.
Aerial Cable Rings.
Inductive Interference from Power Circuits.
No. 14 Type Cable Terminals Equipped with Special Wooden Face Panels.
Change in Condensers Used in Subscribers' Sets.
Composite Cable.
New Breast Plate for Operator's Transmitter No. 234.
Monitoring Circuits.
Tool for Adjusting Middle Spring of No. 125 Type Relays.
Cooperation Between Electric Light and Power Industry and Telephone Industry to Reduce Interference.

Circular Letters—Continued

Private Branch Exchange Switchboard—No. 550-B.
Improved Tinsel Cords for Use in Testing Circuits.
Central Information Desk No. 1.
Plugs for Plugging Out Permanent Signals on Magneto Boards and on Common Battery Boards Employing Cut-Off Jacks.
Telegraph Repeater No. 3-A.
Connecting Blocks for Use at Substations.
[fol. 15557] Clamps.
Modified No. 137 Plug for Use in Testing and Service Observing Circuits.
Inspection of Material.
Universal Type Key and Keyshelf.
Cable Grips.
Guy Anchors—Special Types.
New Head Band for Operators' Receivers.
Tinsel Cords.
Use of Tungsten in Place of Carbon Lamps as Resistance Lamps.
Handbook of Substation Practice.
Telephone Repeaters.
Rubber Tube Protectors for No. 87 Operators' Cords.
No. 4-A Foot Switch for Transmitter Cutout.
Telephone Service at Army Mobilization Camps.
Braided Black Enameled Switchboard Wire.
Semi-Hard Black Rubber in Place of Leather as a Covering for Piling Blocks and Keyshelf Lamp Rails.
Colored Lamp Caps.
Exposed Line Transposition System.
Substation Equipment for Army Mobilization Camps.
Use of 1 Microfarad Condenser in Four-party Relay Sets.
Strain Insulators for Long-Span River Crossings.
Portable Capacity Bridge.
Method of Obtaining Ringing Current from Central Office Storage Batteries.
Modification of "A" Operator's Cord Circuit to Facilitate Testing Outgoing Trunk Assignments.
[fol. 15558] No. 35 Battery Gauge.
Mercury Arc Rectifiers for Charging Storage Batteries.

Circular Letters—Continued

Enameled Wire Switchboard Cable.
Location of the Prepayment Coin Box Service Buttons on Mechanically Locking Keys for Toll Switching Trunks.
Meters for Telephone Power Plants.
Improvements in Call Circuits and Trunk Operators' Telephone Sets.
Connecting Blocks for Nos. 4, 5 and 6 Cable Terminals.
Cable Terminals for Use in Buildings—Standardization of No. 23 Type Cable Terminals, No. 4 Type Distributing Rings and No. 4 Fanning Strips.
Location of Supervisors' Equipment on Additions to No. 1 Subscribers' and Trunk Switchboards.
Use of Explosives.
Standard Message Register Racks and Casings—Change in Type of Lock for Sliding Doors.
Manhole Shields.
Gas Engines.
Fire Protection—General Precautions and Protective Apparatus.
Methods for Supporting and Protecting Conductors at High Tension Crossings.
Joint Use of Poles.
Splicers' Contact Points.
Materials for Drop Wiring.
Patent Guy Anchors.
Location of Incoming Call Circuit Grouping Keys.
Binding Posts for Battery and Ground Supply at Floor Type Main Distributing Frames.
Fire Prevention and Protection in Connection with the Construction of Telephone Buildings.
[fol. 15559] Electrolysis.
Color of Cords, Plug Shells, Key Buttons, and Associated Lamp Caps for Central Office and Private Branch Exchange Equipments.
Manhole Ladders.
Locust Insulator Pins.
Telephone Equipment in Connection with the General Consolidation of Railroad Ticket Offices.

Circular Letters—Continued

Moistureproof Desk Stand Cord.
High Tension Joint Use.
Paper on Design of Transpositions.
Standard Power Plants for No. 1-D Central Office Equipments.
Materials for Cable Work.
Resistance Unbalance in Small Gauge Cable Circuits Either Quadded or for Toll Use—Soldering the Joints.
Machine Bolt.
Inductive Interference from Western Union Telegraph Circuits.
Twisted Pair Rubber Covered Wire—Recommended Change in Practice to Meet War Requirements.
Telephone Repeater Balance Requirements.
Moistureproof and Brown Telephone Cords.
Audible Busy Signal for "B" Switchboards.
Registry of Water Stills for Storage Batteries.
Method of Making Short Multiple Cable Taps.
Inside Wiring Cleats.
New Type Relays to Replace the No. 122 and Similar Relays.
No. 2 Type Lamps for Pilot Signals.
Conversion of No. 84-B to No. 84-E Interrupters.
Insulated Screw Eye—Open Type.
[fol. 15560] Audible Ringing Signal.
Toll Test Board No. 4—Improved Open Location Test Circuit.
Strand Reel Jack.
Standard Fuse Boards and Subscribers' and Trunk Coil Racks.
Toll Switchboard No. 2 and Rural Positions at No. 1 Subscribers' Sections.
Dry Battery Cabinets.
Condensers Used in Subscribers' Sets.
Wire for Subscribers' Drops.
Improved Recall Signals.
Inspection and Testing of the Cable Plant.
Substation Sign Installation—Materials.
Waxed Switchboard Cords.
Station Ground Wire Moulding.
New Finish for Desk Stands.

Circular Letters—Continued

Correctness of Loading Testing Set.
Pipe Ripper.
Castings for Underground Construction.
Cable Racks and Hooks.
No. 14 Ground Wire.
Portable Cord Circuit Repeater Set.
Improper Arrangement of Gas Engine Exhaust Piping.
Electrical Starting of Gas Engines.
Lithoprint Process of Making Prints and Tracings.
Local Operating Room Desks.
Narrow Base Keys for Manual Ringing Trunks.
Cable Reel Trailers.
[fol. 15561] Timing Devices at Recording Boards.
Pole Dinkeys.
Telephone Repeaters—Improved 21-Circuit Test for Balance.
Telephone Repeater Equipment—Space Battery Alarm Circuit.
Repair Clerk's Desk No. 1.
Message Register Keys.
Jack Space for Use with No. 118 Lamp Socket Mounting.
Modified No. 25 Tool.
Machine for Boring Pole Holes.
Decimal Timer Split-Second Stop Watch.
Telephone Interference Factors of Power Voltages.
Final Report of the Joint Committee on Inductive Interference and General Order No. 52 of the Railroad Commission of the State of California.
Portable Resonant Wave Analyzer.
Pipe Caps and Pipe Cap Molds.
Rope Mat.
Aerial Cable Guide.
Wire Type Head Bands for Operators' Receivers.
Trolley and Tree Guards.
Change in A1S Blackburn Ground Clamps.
No. 8 Cable Terminals.
Nos. 26 and 27 Protector Blocks.
"Square Phantom" Telephone Circuits.
Standardization of Open Wire and Office Type Building-Out Condensers.

Circular Letters—Continued

New Induction Coil for Subscribers' Sets.

[fol. 15562] Hundred Second Timer—100 Second Dial Split Second Stop Watch, Direct Readings in Seconds.

Tandem Operation of Telephone Repeaters.

New Operator's Receiver.

Furnace Shield.

Handling of Explosives.

Use of Series Multiple Pothead on Jointly Used Poles.

Standardization of "B" Cable Terminal.

Paper on Telephone Repeaters.

U Cable Guards.

Floor Outlet for Protecting Inside Wires and Cables.

Requirements for Repaired Condensers Employing Paper Dielectric.

Line Impedance Measuring Apparatus.

Cable Balconies and Pole Seat.

Outside Plant Symbols.

Wooden Pole Brackets and Pole Steps.

No. 6 F Connecting Block (13 Pair) and No. 6 Fanning Strip (13 Pair).

Eye Bolts and Eye Nuts.

Grade Clamps.

B Booster Hook.

Distributing Frame Wire.

Magneto Subscribers' Sets Employing 2500-Ohm Ringers of the No. 8 Type.

Cable Extension Arms.

New Substation Protector for Use Where Lines Enter Substations in Cable.

Bridle Wire Insulator.

[fol. 15563] Vacuum Tube Repeater Sockets.

Modifications of No. 4-A Buzzer.

Carrying Case for Protector Blocks.

Bulletin on Sags and Tensions of Suspension Strand for Aerial Cable.

Spout Strap.

Non-Multiple Private Branch Exchange Switchboards for Operation with Machine Switching Central Offices.

Circular Letters—Continued

Substation Installation—Improved Inside Wiring Nail.

Braces for F. X. Terminals.

Central Office Names for Use in Machine Switching Exchanges.

Magneto Substations—Abandoning the No. 12-A and No. 12 AP Protectors.

No. 317 Magneto Type Subscribers' Sets—Use of Desk Stand Transmitter.

24 Gauge Cable.

Precision Type Basic Networks.

Pipe Straps.

Standard Operators' Chairs.

Changes in Subscribers' Numbers in the Series 1 to 999 Due to Introduction of Machine Switching Equipment.

Modifications in Cord Equipment at Outward Toll Positions.

Changes in No. 135 Plug.

Machine Switching Substations—Instruction Cards for Dials.

Machine Switching Substations—Installing Subscribers' Sets with Dial.

No. 59 Type Condensers.

Outline of Special Work in Connection with the Cutover of a Machine Switching Office.

[fol. 15564] Cutover of Machine Switching Offices—Temporary Operators' Positions.

Reduction in Thickness of Cable Sheaths.

Transposition Running Board.

Carrier Current Systems.

Transmission Testing Apparatus—Coding System.

Maintenance Information Covering Private Branch Exchange Switchboard No. 550-C.

Mechanical Toll Ticket Distributing System.

New Substation Coin Collector Circuit to Reduce Beating at Two-Party Selective and Four-Party Semi-selective Stations having Desk Stands.

Preservative Treatment for Pole Butts.

Paper on Carrier Current Telephony and Telegraphy.

Circular Letters—Continued

Enameled Distributing Frame Wire—Change in Coil.
No. 146 Tool for Removing Lamp Caps and Number Plates.
No. 60 Type Designation Strips.
No. 5 and No. 6 Type Signal Plugs.
Improved Heat Coil for Morse Battery Leads.
Spring Tweezers—No. 149 Tool.
Holder for Key Sleeves Used at "A" Operators' Positions.
Designation Strips—Modifications in No. 8 Type.
Machine Switching Substations—Instructing Party Line Subscribers How to Make Reverting Calls.
Ticket Holder for Use at Outward Toll Positions.
Method of Estimating Interoffice Trunk Requirements.
C S Ground Clamp.
Improvements in Construction of No. 20-A Test Set.
[fol. 15565] Calibration of Apparatus for Measurement of Telephone Interference Factor of Voltage.
Method of Operation of Step-by-Step Machine Switching Equipment.
New Apparatus Blank for Machine Switching No. 50 Type Coin Collectors.
Long Handled Shovels and Digging Spoons.
Non-Multiple Cordless Private Branch Exchange for Operation with Machine Switching Central Offices—No. 505-C.
No. 50 Prepayment Type Coin Collector—Steel Housing Construction.
Service Observing Equipment for Use with Machine Switching Central Offices.
Transmission Tests on Manual Exchange Area Circuits and Equipment.
Page Printing Telegraph System Employing Type Bar Printer and Associated Apparatus.
Condenser Arrangement for Neutralizing Crossfire Between Open-Wire Telegraph Circuits.
Galvanized Pole Steps.
Numbering of Line Registers.
Six Pair No. 6-G Connecting Block.
No. 493-B Peg Count Register Key.

Circular Letters—Continued

Improved Single and Double Pulley Cord Weights and Cord Pulleys.
Tinned Copper Sleeve for Cable Conductors.
Improved Open Space Cutout for the Main-Distributing Frame Protector which Mounts on 3/8" Centers.
Sleet Storm Map.
3-A Transmission Measuring Set.
Short Lengths of Inside Wire.
[fol. 15566] Improvements in Operator's Set.
Paraffin Pots.
No. 4 and No. 6 Bridging Connectors.
Substation Soldering Copper Heater.
Fuse Wrench.
4-A Transmission Measuring Set.
D P Insulator.
Underground Construction—Forms for Concrete Manholes.
Method of Assigning Lines and Trunks—Panel Machine Switching Equipment.
Six-Pair Metal Building Terminal Box.
Abandonment of Practice of Providing No. 10 B & S Gauge Conductors in Toll Entrance Cables.
Wooden Apparatus Blanks.
One Sheave Cable Block.
Standardization of Long Cords for Use at Substations.
Standardization of Porcelain Type Open Space Cutout and Nos. 83-A and 84-A Protector Mountings.
Improved Window Frame for No. 10-A Message Register.
Relay Contact Burnisher—No. 265 Tool.
Eastern White Cedar Poles.
3-A Oscillator.
No. 50-A Repeating Coil.
Improved Cross-Connecting Ring for B Cable Terminal.
Telephone Attachments at Substations.
New Substation Transmitter for Use on Long Loops.
High Impedance Ringer to Reduce Inductive Noise on Two-Party Selective and Four-Party Semi-Selective Lines.

Circular Letters—Continued

Public Telephone Stations—Open Type Telephone Booth.

[fol. 15567] Form for Record of Explosives.

Phenol Fibre Tops for Horizontal Type Keys with Indicators.

Cabinets for Storage of Operators' Telephone Sets.

Strength of Old Eastern White Cedar Poles.

Earth Boring Machines.

Substation Number Plates.

M. D. F. Test Plug No. 206.

Improvements in No. 8 Terminals.

No. 2-A Repeater Gain Set—Bulletin No. 27.

Manhole Cover Hook.

Cable Splicing Operations in Machine Switching Areas.

5-A Carrying Case.

Auxiliary Receivers for Use at Substations.

Routine for the Inspection of Operators' Telephone Sets.

Machine Switching Substations—New Dial Cord for Desk Stands.

Metal Subscribers' Sets—Change in Construction of Base.

Small Gauge Non-Quadded Cables Manufactured with Staggered Pair Twist.

Machine Switching—Maintenance of Dials at Substations and Central Offices.

Public Telephone Stations: Booth Lamp Guard.

Power Pumps.

Unit Type Magneto Switchboard No. 1800.

Method of Assigning Lines and Trunks—100 Point Step-by-Step Machine Switching Equipment.

5/8 Inch Forged Eye Nuts.

B Guy Shield.

[fol. 15568] "R" and "S" Cable Balconies.

1-A Transmission Measuring Set, 2-A Oscillator, and Detailed Methods for Making Transmission Tests on Manual Circuits and Equipment.

Method of Operation of Panel Machine Switching Equipment.

Machine Switching Operators' Dialing Tools.

Circular Letters—Continued

Trouble Operators' Positions for Switchboards Nos. 1, 1-C and 1-D.
Toll Operating Room Desks.
Public Address Systems.
Lanterns.
Standard Traffic Engineering Practices for Local and Toll Central Office Equipments.
Pole Derrick Jacks.
Pole Derricks.
Truck Bodies.
Nos. 7, 8 and 9 Fanning Strips.
Storage Battery System for Supplying Coin Collect Current.
Substation Materials—Tools and Gauges—Battery Light.
Substations—Desk Stands—New Felt for Base.
Outside Plant Engineering Practices.
Pulling-Up Clamp.
Strand Puller.
Wooden Cable Dresser.
Blasting Mat.
Wiping Cloths and Crotch Cloths.
Splicer's Mirror.
Multiple Private Branch Exchange for Operation with Manual and Machine Switching Central Offices—No. 600-C.
[fol. 15569] Calculagraphs—Automatic Ribbon Reverse and Improved Winding Tool.
Bower Barff Finished Hand Wheels for Power Switchboards.
New "A" and "B" Operators' Telephone Sets.
Ground Wire.
⅜-Inch Woven Conduit.
Cardboard Containers for First Aid Materials.
Solder Pot.
Paraffin Dipper.
Substations-Protection—No. 60-A Fuse.
Power Plant and Main Distributing Frame Grounding System.
Iron Cable Dresser.
Inadequate Separations on Jointly Used Poles and at Crossings of Telephone Wires over Foreign Wires.

Circular Letters—Continued

Simplex Pole Jack.
Public Telephone Stations—Booth Lamp Receptacle.
Quickly Detachable Dial Mounting for Central Office Switchboards, Attended Pay Stations and P. B. X. Switchboards.
Transposition Practices (Exclusive of Construction).
Use of Shellac on Cable Forms.
Distinctive Markings for Staggered Twist Construction in Small Gauge, Non-Quadded Cables and for Experimental Cables.
135-Cycle Signaling Motor-Generator Sets.
Modification of No. 2 Private Branch Exchange System for Machine Switching Operation.
Cable Bending Spring.
Substations—Materials—Tools and Gauges—No. 311 Tool.
[fol. 15570] Tool for Removing Signal Plugs—No. 274 Tool.
Toll Transmission Practices—Section IX-A—Vacuum Tubes Used in the Bell System—Bulletin No. 77.
Telephone Repeater Data—Section II-E—Arrangement for Connecting Cord Circuit Repeaters to Circuits Terminated with Three-Winding Transformers—Bulletin No. 74.
Transmission Maintenance Practice—Section VIII-E—Routine for Toll Circuit Layout Records.
Manhole Platform Support.
Waxed Linen Thread.
Rubber Bandages and Bag for Rubber Bandages.
Splicers' Tents.
Substations—Signs—Sign Cement Kit.
Toll Switchboard No. 1—Flush Type Glass Keyshelf Bulletin Holder.
Round Washers.
Half Round Wooden Moulding.
Substations—Tools and Gauges—Transmitter Carrying Bag.
Type A Porcelain Knob.
Substations—No. 152-A Backboard for Loud Ringing Bells.
Insect Injury to Cable Sheath.

Circular Letters—Continued

Termination of Railroad Dispatch and Message Circuits in P. B. X. Switchboards.
Splicer's Fibre Test Board.
Goggles.
Substations—Coin Collectors—Carrying Case for Coin Relays and Container for Coin Chutes.
Renumbering Strips.
Pot Hook.
[fol. 15571] 1-Inch Cotton Tape.
Shave Hook.
Fanning Strips for Cable Terminals.
Terminal Tag.
Rubber Tape.
"B" Tree Guard.
Chipping Knife.
Fanning Strips for Protected Building Terminals.
Substations—Coin Collectors—No. 50 Type for Post-payment Service.
Phantom Repeating Coils.
Sag Gauge.
Linemen's Hand and Test Sets—Standard Cords and Change in Finish.
Standardization of Lengths of Stub on No. 14 Cable Terminals.
Storage Battery System for Supplying Message Register Current in Manual Offices.
Terminal Marking Outfit.
Terminal Clamp.
Eye-Bolt Method for Dead-Ending Strand and Attaching Guys.
Devices for Securing Cable Clamps to Masonry.
First Aid Supplies.
Apparatus Blanks for Covering Banks of Unused Subscribers' Multiple Jacks.
Transmission Maintenance Practices—Section VI-B—Methods for Making Transmission Tests on Step-by-Step Machine Switching Circuits and Equipment.
Square Washers.
Bulletin Holder for Use on Switchboard Sections.

Circular Letters—Continued

[fol. 15572] Carrier Current Systems Data—Sections V-C and D—"Carrier Telegraph System Terminal—Type 'B' "—Bulletin No. 94.
Stove Bolts.
Maintenance Tools for No. 14 Cable Terminals.
Substations—Test Sets—No. 17 Linemen's Type.
Crosstalk Practices Sections V-A—50-A Crosstalk Set—Bulletin No. 80.
No. 29-B Binding Post.
Telephone Repeater Data—Section II-B—Singing Point Data.
Clearing Substation Grounds on No. 26 and No. 27 Protector Blocks by Means of 200-Volt Breakdown Test.
Line Thermometer.
Guy Rule.
Substations—Tools and Gauges—Shellac Set for Installers and Repairmen.
Toll Signaling Equipment—Adjustable Back-Stop for No. 150 Type Relays.
Trouble Back Flash.
Local Peg Counts.
Toll Peg Counts.
Traffic Summaries.
Changes on Peg Count Summary and Statement of Traffic Costs.
Notes on Work Involved in Installation of Standard Toll Rate Quoting Systems.
Central Office Operating Routine, Telegrams Telephoned.
Fire Drills for Operating Force.
Standard Local Operating Practice—Multiple Markings and Number Change Bulletins.
[fol. 15573] Standardization of Toll Tickets.
Standard Local Operating Methods—Disposition of Calls Resulting in Busy Reports.
Standard Toll Operating Methods: ST, TT and CC Methods.
Toll Line Efficiency.
Division of Toll Board Traffic.
Toll Recording Systems.
Improved Two-Number Toll Operating Method.

Circular Letters—Continued

Standard Local Operating Methods—Handling Calls to Private Branch Exchanges When the Attendant is not on Duty.
Standard Two-Number Toll Service Observing Method.
Losses from Operating Force.
Standard Local Operating Practice.
Peg Count Accuracy.
Training of Toll Service Observers—Special Correspondence Course Plan.
Information Regarding the New Telephone Number or Location of Subscribers Who Move from One Exchange District to Another.
Peg Count Form E-101-B; Hourly Peg Count Record.
Improved Toll Operating Practices.
Connection Between United States Coast Guard Lines and the Bell System.
Single Ticket Method—Collect Calls.
Standard Local Operating Practice—Forwarding Sections Applying to Switchboards of the No. 1-C Type.
Use of Toll Service Observing Data for Effecting Improvement in Toll Service and Operating.
Condensed Peg Count Summary.
[fol. 15574] Changes in Operating Practices Required by the Daylight Saving Law.
Revised Traffic Circular No. 27—Toll Peg Counts and Revised Toll Coefficients.
Standard Local Operating Text Book.
Instructions for Determining the Rates and Charges for the Different Classes of Toll Service Established by Order No. 2495 of the Postmaster-General.
Adjustment of Force.
Local Operating Text Book for Training as to Ticketed and Registered Message Rate Operating.
Collection of Federal Tax on Telephone Messages.
List of Stations in Toll Tariff Books.
Junior Operators' Text Book.
Record of Completed Toll Calls to Replace Lost Call Record.
Toll Line Efficiency—Basic Data for Toll Line Engineering Purposes.

Circular Letters—Continued

Operating Instructions in Connection with the Standard Classification of Toll Service and Schedule of Toll Rates.

Toll Service Observing.

Notes on Local Training Department Equipment and Arrangement of Building Space.

Use of Routine Toll Service Observations for Maintaining a Record of Speed of Service on Important Toll Traffic Routes.

Notes on Method for Use in Training Departments for Local Operators.

Dispatch Method for Handling Toll Calls.

Use of Plug Count Records for Balancing "A" Board Loads.

Daily Force Conditions.

Local Service Notes.

Central Office Instructions.

[fol. 15575] Discontinuing the Practice of Holding at Recording Boards.

Toll Service Observing—Call Circuit Method Traffic.

Toll Line Engineering—Tables of Circuit Group Capacities.

Monthly Force Condition Summary—Form E-140.

Instructions for Attendants at Private Branch Exchanges.

Standard Toll Operating Practice—Supplementary Instructions Covering the Handling of Calls with Stations Connected to a Local Mechanical Office.

Method of Repeating Five Digit Numbers and Numbers to which Zeros have been Prefixed.

Toll Line Engineering—Method for Collecting and Summarizing Basic Traffic Data.

Local Manual Service Observing.

Standard Toll Operating Practice.

Outward Operators' Text Book, Recorders' Text Book, Inward Operators' Text Book.

Count of Employee Hours.

Equating Traffic.

Ventilation and Heating of Central Offices and Operators' Quarters.

Objective and Basic Loads.

Circular Letters—Continued

Instructions for Attendants at No. 505-C Private Branch Exchanges.
Single Ticket Operating Method—Overlap Ringing.
Quiet Operating Rooms.
Suggestions as to Protection of Operating and Clerical Forces Against Colds and Similar Infections.
Development and Handling of Toll Sequence Service.

[fol. 15576] Specifications:

Steel Framework for Central Office Equipment.
Local Chief Operator's Desk No. 3.
Toll Chief Operator's Desk No. 2.
Woodwork and Leather for Central Office Equipment.
Slate Used in Central Office Equipment.
Gas Engine for Use in Telephone Exchanges.
Eleven Pair Lead-Covered Submarine Emergency Cable.
Twelve Pair Emergency Line Cable.
Standard Reel Rack.
Seven Pair Emergency Line Cable.
Toll Test Board No. 2.
Toll Test Board No. 1.
Lead-Covered Cable with Wool Insulation for Inside Construction.
Manager's Desk No. 7.
Information Desk No. 5.
Dead Man.
Nails (Galvanized and Tinned).
Fifteen Conductor Emergency Cable Reel.
Portable Service Testing Set No. 1.
One Pair Emergency Cable Reel.
One Pair Emergency Cable.
Description of Central Office Equipment with Relay Switchboard No. 9.
Manhole Guard.
Installing a Gas Engine for Use in Telephone Exchanges.
Stringing Hard-Drawn Copper Wire.
[fol. 15577] Wire Chief's Desk No. 7.
Red Cedar Poles.

Specifications—Continued

Chief Operator's Desk No. 6.
Manager's Desk No. 8.
Chief Operator's Desk No. 7.
Chief Operator's Desk No. 8.
Light Galvanized Steel Seven Wire Strand (Mild Steel).
Wiring of a Central Office Equipment.
Central Office Equipment with Relay Switchboard No. 9 for Small Office with Single Position.
Fire and Sand Pails.
Hole Cleaner.
Installation of Office Terminals of Wool Insulated Cable.
Inspection of a Dirt Auger.
Crossarm Cleats.
Asbestos Blanket with Containing Case.
Galvanized Steel Suspension Wire.
Cleats and Binding Posts for Cable Boxes.
Inspection of No. 4 Protectors and Associated Apparatus.
Inspection of a Box for Holding Protector Parts and Tools in Cable Boxes.
Ten Pair Bridle Wire Cable.
Five Pair Bridle Wire Cable.
Wire Chief's Desk No. 8.
Description of the Method of Operation for Wire Chief's Desk No. 8.
Wire Chief's Desk No. 9.
[fol. 15578] Description of the Method of Operation for Wire Chief's Desk No. 9.
Lockers.
Standard Combination Reel.
Instructions for Connecting Special Steel and Copper Wire at Long Spans.
Six Pair Bridle Wire Cable.
Chief Operator's Desk No. 9.
An Extension Fixture.
Structural Steel.
Lead-Covered Paper Insulated Bridle Cable.
Wall Tent Stoves.
Creosoted Gum Plank.

Specifications—Continued

Description of a Central Office Equipment with Relay Switchboard No. 10.
Chief Operator's Desk No. 10.
Wire Chief's Desk No. 10.
Method of Operating Wire Chief's Desks No. 10 and No. 11.
Instructions for the Maintenance Inspection of Crossarms and Guying.
Five (5) Wire Crossarm Cleat No. 2.
Construction of 40 to 80 Wire Pole Lines.
6,000 Pound Strand.
10,000 Pound Strand.
16,000 Pound Strand.
Toll Supervisor's Set No. 4.
Toll Supervisor's Set No. 5.
Creosoted Blocks for Three Block Anchors.
Wire for Lightning Arresters T-533-B.
[fol. 15579] Wire Chief's Desk—Wall Type No. 11.
Instructions for Use of Creosoted Three Block Anchors.
Method for the Analysis of Solder.
Aerial Cable Hangers.
Protection of Telephone Lines Crossing High Potential Lines—Short Span Method of Protection.
Toll Ticket Filing Desk No. 1.
Substation Ground Wire.
Transposition Glass Insulators.
Inspection of a Long Handle Shovel.
Inspection of a Digging Spoon.
7,000 Pound Two Wire Galvanized Steel Strand.
Treated and Untreated Square and Round Conduit Plugs.
Installation of Iron Case Loading Coils on Open Wire Lines.
Steel Prod.
Malleable Castings.
Treated Wrought Pipe and Lap Welded Casing.
Staples.
Carriage Bolts.
Instructions for Making Phantom Circuit Transpositions.

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Specifications—Continued

Galvanizing for Iron and Steel.
Wire Chief's Desk No. 2.
Method of Operation for Wire Chief's Desk No. 2.
Phantom Circuit Transpositions.
Malleable Iron Clamp.
Cribbing Guards.
[fol. 15580] Creosoted Plank for Two Block Anchors.
Paper Sleeves for Splicing Paper Insulated Cables.
Making Phantom Circuit Transpositions with Pole Circuits on Adjacent Arms as Side Circuits.
Phantom Circuit Transpositions with Pole Circuits as Side Circuits.
Crossarm Paint.
Long Open Wire Spans at River Crossings.
Galvanized Best-Best Iron Wire.
Galvanized Steel Wire.
Installation and Operation of Pole Relays No. 191-A.
Galvanized Steel Wire for River Crossings.
Installation of Local Telegraph Sounders.
Lightning Arrester T-533-B.
Installation of Bridle Wire Electrose Insulators.
Standard Black Pole Paint.
Standard White Pole Paint.
Galvanized Pole Brackets.
Crossover Clamps.
Steel Angle Support for Long Span Wire Hanger on Pole Fixture.
Bridle Cable Hanger.
Stub Reinforcement for Poles.
Single and Twisted Pair Braided Rubber Covered Wire for Morse Circuits.
Transposition Bracket for Double Petticoated Porcelain Insulators.
Creosoted Yellow Pine Crossarms.
Exchange Aerial Construction.
[fol. 15581] Installation and Operation of Composite Ringing Set for Telephone Lines.
Eastern White Cedar Poles.
Installation of Iron Case Loading Coils on Phantom Open Wire Lines for Phantom Circuits 1-2-3-4, 3-4-5-6, 5-6-7-8 and 7-8-9-10.

Specifications—Continued

Installation of Iron Case Loading Coils T-685 on Open Wire Lines for Circuits 1-2 and 3-4 and Corresponding Circuits on Other Arms. Arranged so that Phantom Coils T-680 may be Installed on These Circuits at Some Future Time.

Installation of Phantom Loading Coils T-680 on Open Wire Lines for Phantom Circuits 5-6-7-8 and Corresponding Circuits on Other Arms. Arranged so that Loading Coils T-685 may be Installed on These Circuits at Some Future Time.

Inspection of Worn No. 49 Jacks.

Inspection of Worn Plugs No. 109 and No. 110.

Installation of Phantom Loading Coils T-680 on Open Wire Lines for Phantom Circuits 1-2-3-4, 3-4-5-6 and 7-8-9-10 and Corresponding Circuits on Other Arms. Arranged so that Loading Coils T-685 may be Installed at Some Future Time.

Galvanized Aerial Cable Rings.

Galvanized Pothead Support.

Pole Tongs.

Galvanized House Bracket for Dead-Ending Copper-Steel Drop Wires.

Cable Suspension Clamps.

Instruction for Placing Loading Coil Cases and Connecting Loading Coils to Underground Cable Conductors Used in Parallel.

Vitrified Clay Conduit.

Installation of a No. 44-C Retardation Coil on Open Wire Circuits to Obtain a Rural Line Phantom.

Western White Cedar Poles and Guy Stubs.

[fol. 15582] Galvanized Sheet Iron Cable Shields.

Sawed Redwood Poles.

Dipping Douglas Fir Crossarms in Hot Carbolineum.

Painting Crossarms.

Porcelain Knobs.

Insulating Sealing Compound.

Carbolineum and Similar Wood Preserving Oils.

Analysis of Carbolineum and Similar Wood Preserving Oils.

Toll Test Board No. 4. Description of Apparatus and Methods of Testing.

Specifications—Continued

40-60 Solder.
45-55 Solder.
50-50 Solder.
Pothead Wire.
Installation and Maintenance of an Automatic Switch in Electrolysis Drainage Wires.
Toll Test Board No. 4.
Wheatstone Bridge No. 111077 Toll Test Board No. 4.
Cement.
Inspection of Cement.
Rack for Composite Sets and Composite Ringer Sets.
Replacement and Reinforcement Inspection of Pole Lines.
Installation of Loading Coils T-300, T-680 and T-685 on Open Wire Lines.
Crossarm Braces.
Hub Guards.
No. 17 Gauge Tinned Copper Steel Wire.
Composite Sets for Telephone Lines.
[fol. 15583] Artificial Cables for Use in Transmission Testing.
Underground Conduit Construction.
Installation and Operation of Simplex Sets.
The Brush Treatment of Poles.
Standard Intermediate Distributing Frames.
Transposing Single and Phantom Circuits and Dead Ending Wires at Test and Terminal Poles, Each Wire Attached to a Separate Insulator.
Provisional Specifications for Gray Iron Castings.
Provisional Specifications for Conduit Castings.
Provisional Specifications for Pulling-In Iron.
No. 22 Gauge Lead Covered Silk and Cotton Insulated Cable Without Color Code.
No. 22 Gauge Lead Covered Silk and Cotton Insulated Cable with Color Code.
Filled No. 22 Gauge Lead Covered Silk and Cotton Insulated Cable with Color Code.
Master Specifications for Armored Submarine Duplex Cable.
Composite No. 19 and No. 22 B. & S. Gauge Duplex Cable.

Specifications—Continued

Instructions for Installing Duplex Cable Using Capacity Unbalance Testing Sets.
Master Specifications for Duplex Cable.
Duplex No. 19 and No. 16 B. & S. Gauge Lead Covered Silk and Cotton Insulated Cable.
Standard Relay Racks.
Analysis of Dead Oil of Coal Tar or Coal Tar Creosote.
The Care and Operation of Storage Batteries.
Standard Message Register Racks and Casings.
Local Test Desk No. 12.
[fol. 15584] Local Test Desk No. 12—Description and Method of Operation.
Liquid Grade Dead Oil of Coal Tar.
Creosoted Rock Elm Insulator Pins.
No. 14 Ground Wire.
Inside Wire.
Standard Main Distributing Frames.
Douglas Fir Crossarms.
Aerial Cable Safety Straps.
Substation Apparatus.
Substation Apparatus Installation.
Substation Wiring.
Substation Connections.
Adjustment of Substation Apparatus.
Substation Sign Installation.
No. 50 Coin Collector Installation.
No. 50 Coin Collector Maintenance.
Substation Wiring Plans.
Main Frame Protection—"B" Type Frames.
Main Frame Protection—"A" Type Frames.
Preliminary Specifications for Locating Telephone Circuit Transpositions. Exposed Line Transposition System.
General Specifications for Equipments for United States Military Mobilization Camps—One Infantry Division.
General Cable Splicing.
Underground Cable Splicing.
Aerial Cable Splicing.
Black Cable Splicing.
House Cable Splicing.

Specifications—Continued

[fol. 15585] Substation Protection Including Private Branch Exchanges.
Strand Connectors.
Pole Line Construction.
Guying.
Open Wire Construction.
Aerial Cable Construction.
Drop Wiring.
Block Cable Construction.
House Cable Placing.
Douglas Fir Guard Arms.
Creosoted Yellow Pine Guard Arms.
Reinforcing Links.
Guy Rods Integral to Patent Guy Anchors.
Galvanized Wood Screws.
Hand Magazine for Dynamite.
Hand Magazine for Electric Blasting Caps.
Wooden Pole Steps.
Tree Blocks.
Creosoted Pine Stubs.
2,200 Pound Strand.
Provisional Specifications for Paraffin.
Instructions for Using Correctness of Loading Testing Set in Installing Loading Coils.
Standard Fuse Boards.
Tin Coating on Copper Wire.
No. 19 A. W. Gauge Armored Submarine Cable.
Care of Trailer Axle Bearings.
[fol. 15586] Operation of Cable Reel Trailer.
First Aid.
Underground Cable Placing.
Tree Pruning.
Thimbles.
Cable Terminating.
Jointly Used Wood Pole Lines Carrying Supply Circuits and Signal Circuits.
Porcelain Strain Insulators.
Drive Screws.
Reinforcing Strap.
Distributing Frame Wire.
455 Pair No. 19 Gauge Cable.
Body Belt and Safety Strap.

Specifications—Continued

Dowel Pins.
Cable Terminal Wire.
Rock Guy Anchors.
Creosoted Wood Conduit.
Creosoted Plank.
Sleeve Twisters.
Steel Cable Crossarms.
CL Tree Wire.
Weatherproof Copper Wire.
Bridle Rings.
Exchange Insulators.
Toll Insulators.
Double Petticoated Insulators.
[fol. 15587] Second Grade Vitrified Clay Conduit.
The Submersion Treatment of Poles.
No. 24 Gauge Cables, Aerial, Type "NM".
No. 22 Gauge Cables, Type "ANA".
No. 19 Gauge Cables, Type "ANB".
Ground Rods.
Muslin.
No. 22 Gauge Cables (For Underground Use), Type "ASA".
Use of Dynamite.
Weatherproof Steel and Best-Best Wire.
Strain Plates.
Thimble Guy Rods.
Copper Wire.
Copper Tie Wires.
Tinned Steel Sleeves.
Copper Sleeves.
Stubbing Bolts.
Routine for Report of Cable Troubles.
Code for Reporting Cable Troubles.
045 Tinned Alloy Wire.
Bronze Drop Wire.
Wooden Pole Brackets.
Galvanized Pole Steps.
Construction Chains.
Washers.
One Bolt Clamp.
[fol. 15588] Rosin Core Solder.
S Tree Wire.

Specifications—Continued

Tamping Bar.
Cable Protection.
Maintenance of Automatic Electric Company's Dials at Substations.
Machine Switching Substations.
Chestnut Poles.
Black Stencil Paint.
Orange Stencil Paint.
Substation and Private Branch Exchange Protector Installation.
Underground Conduit for Service Connections.
Crossarm Bolts.
Green Pole Paint.
Operation of Power Diaphragm Pump.
Guy Clamp.
Braces for Extension Fixture and Terminal Pole Crossarms.
Friction Tape.
Houseline.
Railroad Crossings.
Cable Clamps and Cable Clamp Rings.
Operation of Pole Derricks.
Bolts for Cable Suspension Clamps.
Bonita Cable Rings.
Digging Bar.
Cant Hooks.
Creosoted Yellow Pine Poles.
[fol. 15589] Cast Iron Bends.
Stop Accidents Insigne and Year Plates.
Wooden Insulator Pins.
Cable Car.
Manila Rope.
Coal Tar Creosote.
Creosote—Coal Tar Solution No. 1.
Creosote—Coal Tar Solution No. 2.
Creosoting Timber.
Creosoting Yellow Pine Crossarms.
Pike Poles.
Terminal Marking.
Rubber Gloves.
Creosoting Douglas Fir Timber.
Creosoted Douglas Fir Conduit.

Specifications—Continued

Corner Bridle Rings.
Maintenance of No. 14 Cable Terminals.
Steel Tie Wires.
D Cardboard Container.
Tourniquet.
Reducing Couplings.
B First Aid Box.
C First Aid Box.
D First Aid Box.
Creosoted Multiple Wood Conduit.
British Creosote.
[fol. 15590] 1½ Inch Compresses.
3 Inch Compresses.
Iodine Swabs.
Wire Splint.
Provisional Specifications for Lead Sleeving.
Western Cedar Poles.
Manhole Frames and Covers.
Butt Treating Cedar Poles.
Enameled Telephone Signs.

[fol. 15591] Toll Case—Rhodes Exhibit 87

Some Cases of Work Completed

(Plant Matters Only. Traffic and Commercial Problems Not Included)

Equipment Matters:

Improved Switchboard Section—No. 92 Jack "A" Section.
Improved Switchboard Section—No. 49 Jack "A" Section.
Improved Switchboard Section—No. 92 Jack "B" Section.
Improved Main Distributing Frame.
Improved Intermediate Distributing Frame.
Improved Relay Rack.
Improved Coil Rack.
Improved Fuse Panels.
Improved Message Register Racks and Casings.
Improved Miscellaneous Equipment Practices.

Equipment Matters—Continued

Improved Miscellaneous Installation Practices.
Auxiliary Framing for Frames and Racks.
Location of Rolling Ladders.
Standardization of Switchboard Wiring and Mounting of Apparatus for Central Office Equipment and Private Branch Exchange Equipment.
Improved Keyless and Machine Ringing Trunks.
Improved Toll Cord Circuits to Overcome Transmission Losses.
Improved Circuits for Call Wire Toll Lines.
Improved Toll Switchboard Section.
Improved Switchboard Cord Weight.
Improved Switchboard Plug Shelf.
Improved Switchboard Cord.
Improved Method of Switchboard Lighting.
[fol. 15592] Improved Mounting for Central Office Protectors.
Improved Private Branch Exchange No. 4.
Improved Switchboard Plug.
Combined Ringdown and Recording Trunks.
Design of Fire Screens for Switchboard Sections.
Determination of Limits of Wear for Switchboard Plugs and Jacks.
Standardization of Gas Engines.
Design of More Economical Condenser.
Design of Multiple Private Branch Exchange.
Study of Comparative Economies from the Use of Gas Engines as Compared with Electric Motors, Defining the Proper Field for Each.
Improvement in Storage Batteries.
Standardization of Method of Adding Plates to Storage Batteries.
Standardization of Central Office Power Machines and Accessories.
Investigation of Mercury Arc Rectifiers for Charging Storage Batteries.
Standardization of Flameproof Distributing Frame Wire.
Improved Pole Changer.
Standard Floor Plan Arrangements for Telephone Buildings in Single Office Districts.

Equipment Matters—Continued

Standard Floor Plan Arrangements for One-Unit Telephone Buildings in Multi-Office Districts.
New Line and Cut-Off Relay.
Improved Supervisory Relay.
Switchboard Clock for "A" Positions.
Standard Specifications for Repaired Material.
Modified Nos. 38, 39 and 40 Terminal Strips.
Method of Wiring Condensers in Toll Cord Circuits.
[fol. 15593] New Transmitter Arms.
Circuit for Grouping "A" and Toll Switching Positions.
Changes in Equipment and Arrangement of No. 1 Trunk Switchboard Keyshelves.
Changes in Nos. 5 and 23 Induction Coils.
Alarm Signal for Main Discharge Fuses.
New Design of the No. 65 Terminal Strip for Horizontal Side of Main Distributing Frames.
Method of Handling Toll Calls from the New Type Prepayment Multi-Coin Boxes.
Use of Tungsten Lamps for Resistances in Coin Box Trunk Leads.
Revised Specifications for Simplex Sets.
Wiring of the Outgoing Trunk Multiple Directly to the Main Frame and Intermediate Type Terminal Strip for the Main Distributing Frame.
Peg Count Register Key.
New Standard Central Office Register—Lock-up Type.
Tool for Removing Worn No. 49 Jack Sleeves.
Direct Current Commutating Pole Motors for Charging Generators.
Gauges for No. 92 Jack Sleeves.
Machine Ringing—Premature Operation of Tripping Relays Due to Breakdown of Line Insulation.
Specifications for Message Register Generators.
Battery Boxes for Dry Cells—Use of Dry Cells for Morse Local Battery and Transmitter Local Battery.
Tool for Removing Lamp Caps Mounted on Close Centers.
Cord for Suspended Type Transmitter.
Supply Ringing Current over Cable Pairs to Private Branch Exchanges.

Equipment Matters—Continued

Standard Drop Light Handle on Guard for Use in Operating and Terminal Rooms.
Improved Operator's Telephone Set Cord.
[fol. 15594] Power Plant Wiring—Omission of Individual Cell Voltmeter Leads to Storage Batteries.
Emergency Plugging-Up Cords.
Pick-Up Alarm Circuits—Machine Ringing.
Improved Type "A" and "B" Composite Ringers.
Repair of Tinsel Switchboard Cords.
High Impedance Relay for Use in New Toll Cord Circuits.
Testing Circuit for Use in Connection with New Toll Cord Circuits.
Folding Handle for Emergency Hand Generators.
Machines for Cleaning Switchboard Plugs.
Automatic Keyshelf Brace.
Arrangement of Keyboard Lamp Caps and Guards and Pilot Lamp Caps and Guards.
Railroad Private Branch Exchange Equipment.
Oil Insulators and Pedestal Supports for Mounting Storage Batteries.
Improved Monitoring Arrangement for Operators' Telephone Sets.
Starters for Alternating Current Motors.
Improved Telegraph Key.
Glass Sand Trays and Glass Covers for Storage Batteries.
Methods of Handling Trouble Reports.
Improved No. 9 Switchboard.
Improved Local and Toll Service Observing Desks.
Specifications for Storage Batteries.
Specifications for the Care and Operation of Storage Batteries.
Primary Battery for Current Supply for Magneto Switchboards.
Improved Local Test Desk.
Improved Small Magneto Switchboards.
[fol. 15595] Redesigned 3 by 7 Cordless Private Branch Exchange.
Private Branch Exchange No. 550-A.
Improved Ringdown Trunk Circuits for Lines Exposed to Inductive Disturbances.

Equipment Matters—Continued

Improved Signaling for Ringdown Trunks.
Service Observing Circuit for No. 10 Switchboard.
Subscribers' Line Cabling and Jumper Wiring for Four-Party Jack per Station Lines.
Modification of No. 1 Private Branch Exchanges for Lamp Signals.
Automatic Call Circuit Selecting Arrangements.
Private Branch Exchange Cord Circuits for Use on Night Connections.
Circuits Employing Gang Keys.
Improved Waterproof Switchboard Cable.
Switchboard Cord Protector.
High Frequency Generator for Composite Signaling.
New Type of Switchboard Cable.
Improved Wire Chiefs' Desks.
Improvements in Small Common Battery Switchboards.
Small Toll Ticket Distributing Systems.
Composite Ringer Testing Set.
Improved Method of Terminating Phantoms.
Improved No. 2 and No. 10 Toll Cords.
Toll Service Observing Circuit for Repeaters.
Improved Double Pulley Cord Weight.
Improved Single Pulley Cord Weight.
Alarm Circuit for Message Register Machines.
Grouping Arrangements at "B" Positions.
"A" Operators' Cords to Give Busy Tests on Trunks.
[fol. 15596] Glass Window for Message Register Dust Caps.
Improvements in No. 84 Type Interrupters.
Improved Universal Key and Key Base Complete.
Improved Lamp Socket Mountings.
Investigation of Speed and Voltage Regulators.
Electrical Starting Equipment for Gas Engines.
Automatic Cell Fillers for Storage Batteries.
Parallel Operation of Mercury Arc Rectifiers.
Narrow Base Key for Manual Ringing Trunks.
Fibre Faced Jack Spaces.
Vacuum Tube Repeater Cord—Inductive.
Vacuum Tube Through Line Repeater Cord—Inductive.

Equipment Matters—Continued

Vacuum Tube Repeater Cord—Non-Inductive.
Vacuum Tube Through Line Repeater Cord—Non-Inductive.
Mechanical Repeater Cord—Inductive.
Mechanical Through Line Repeater Cord—Non-Inductive.
Emergency Repeater Cord.
Routine and Equipment for Handling Trouble Reports and Certain Associated Work.
Development of New Toll Cord Circuits to Replace the Present No. 2 and No. 10 Toll Cords.
Development of Trunk for Use Between Toll Board and Local Information Desk.
Mounting for Grouping Key and Emergency Call Circuit Key.
Reduction in Cost of Platinum Contacts.
Development of Magneto Switchboard with Combined Drops and Jacks.
Redesign of No. 32 Lamp Socket for Pilot Signals.
Repair of Switchboard Cords at the Switchboard.
New Design of Trunk Designation Strip.
[fol. 15597] Improved Trunk Operator's Telephone Set Circuit.
Subscriber's Set for Rural Stations.
Compact Subscriber's Set for Hotels.
Portable Set to be Carried on Street Railway Cars.
Standard Subscribers' Sets of Metal Construction.
Black Finish for Desk Stands and Ringer Gongs.
Standard Scheme for Tracer Colors in Desk Stand cords.
New Design of Terminal Rack and Cord Bushing of Desk Stands.
Improved Tinsel Conductors in Substation Cords and Other Changes in Braids and Terminals.
Standard Keys in Housing for Mounting at Substations.
Standard Dry Cell for Local Battery Telephones and Other Telephone Service.
Standard Gauge for Testing Dry Batteries.
Metal Box to Contain Dry Batteries at Local Battery Stations.

Equipment Matters—Continued

Standard Multi-Coin Collector Arranged to Take Nickels, Dimes and Quarters for Toll and Long Distance Calls on a Prepayment Basis.

New Single Coin Collector to Receive Nickels on a Prepayment Basis.

Investigation of Causes of Electrolytic Corrosion of Prepayment Coin Collector Windings in Service.

Standard Telephone System for High Class Residences Providing Inter-Communicating Service Between Sets and Regular Exchange Service.

New Four-Party Selective Ringing System Using Superimposed Ringing Current.

Standard Telephone Booth with Folding Doors.

Standard Signs for Telephone Pay Stations.

Standard Light Portable Test Set for Use of Linemen.

Standard Terminal Blocks for Making Connections to Inside Wire and Cords at Substations.

Equipment for Ventilating Telephone Booths.

[fol. 15598] Standard Plates for Attaching to Telephone Instruments.

Standard Methods for Economically Handling Transmitters and Receivers Removed from Substations.

Metal Telephone Booths.

New Loud Ringing Extension Bell Sets.

Standardization of New Spring Terminals and Standard Connectors for Dry Batteries.

Attachments Which May be Applied to Coin Collectors, Enabling the Collection of the War Tax on Telephone Messages.

Telephone Substation Equipment of Special Design for Service in Mines.

Improvement in Design of Mouthpiece of Operator's Transmitter.

Standard Methods for Adjusting Ringers.

Mounting for Protectors Exposed to Weather.

Improved Winding of Standard Substation Ringer.

New Finish for Breast Plates of Operators' Transmitters.

Development of Apparatus for Automatically Registering the Number of Telephone Calls at Coin-Collector Stations.

Equipment Matters—Continued

Self-Locking Cash Box.
New Head Band for Operator's Receiver.
Plug for Use in Connecting Portable Subscribers' Sets.
Development of Special Equipment for Use of United States Government in Coast Guard Service.
Telephone Equipment for Transmitting Speech to Large Public Gatherings.
Steel Desk Stand With Permanent Bower Barff finish.
Moistureproofing of Standard Desk Stand Cord.
Investigation of the Durability of Enamel in Comparison with Silk and Cotton as Insulation for Wire.
Investigation of Changes in Standard Substation Ringer.
New Method for Refinishing Repaired Desk Stands.
Desk Stand Bases with Longer Life for the Felt.
[fol. 15599] Small Test Board for Joint Offices.
Morse Storage Battery Fuse Panel.
Modification of "A" Operator's Cord Circuit to Facilitate Testing Outgoing Trunk Assignments.
Redesign of Trunk Operator's Busy Test Circuit.
Recall Signal for No. 601 Private Branch Exchange Trunks.
Toll Cord Circuit with Telephone Repeater.
High Efficiency Head Receiver.
Emergency Toll Equipment.
Emergency Switchboard Equipment.
Telephone Set for Railroad Offices.
Small Private Branch Exchange.
Steel Desk Stand.
Two-Frequency Four-Party Ringing.
Improved Private Branch Exchange Switchboard.
Improved Finish for Transmitters.
Revision of Circuits to Permit Use of Multiple Line Signals.
Ringing Generator for Superimposed Ringing.
Auxiliary Receiver.
New Common Battery Switchboard.
Gas Engine Equalizers.
Investigation of Cut-off Relays.

Equipment Matters—Continued

Telephone Repeater Cord Circuit for Emergency Use.

Operation of Morse Storage Batteries.

Direct Current Adjustment for Biasing Springs of Substation Bells.

Loud Ringing Extension Bell for Four-Party Selective Service.

United States Bureau of Standards Conference on Dry Cells.

[fol. 15600] Outside Plant Matters:

Preparation of Rules Governing the Economical Maintenance Replacement of Poles.

Consideration of Northwestern Cedar Men's Association Specifications for Cedar Poles.

Development of Specifications for Western Cedar Poles.

General Investigation of the Preservative Treatment of Poles and Crossarms and of Various Preservative Compounds.

Study of the Relative Economies of Treated and Untreated Poles for Use in Different Sections of the United States.

Analysis of Creosote Recovered from Poles in Service and Study of Changes in the Creosote with a View to Improving our Specifications.

Revision of Specifications for Creosote and Carbolineum.

Development of a New Method for Attaching Aerial Cables to their Supporting Strands by Metal Rings.

Revision of Standard Specifications for No. 19 and No. 22 Gauge Cable.

Modifications of Standard Methods of Aerial Cable Construction.

Development of 1200 Pair Cable.

Development of 900 Pair Cable.

Development of 300 Pair Submarine Cable.

Development of Improved Methods for Splicing Submarine Cable.

Outside Plant Matters—Continued

Introduction of Antimony Lead Alloy for Cable Sheaths.

Preparation of Standard Handbook of Exchange Aerial Construction Methods.

Determination of Proper Construction to Employ at Crossing Points of Telephone Lines over Railroad Right of Way and Standardization of this Construction with the Committee of Railway Telegraph Superintendents.

Study of the Extent and Range of Each Sleet Storm in the United States that has Seriously Affected the Telephone Plant.

[fol. 15601] Inspection and Study of Line Breaks to Determine what Changes, if any, Should be Made in Standard Specifications to Reduce Trouble of this Kind.

Development of a Cheaper Type of Twisted Pair Rubber Covered Outside Distributing Wire.

Determination of Proper Requirements for Insulation Resistance for Outside Distributing Wire and for Inside Wire for Substation Use.

Standardizing Best Type of Rubber Covered Wire for Potheads.

Development of a Small, Non-Hygroscopic Flameproof Wire for Use on Cross-Connecting Frames.

Development of Pothead Sealing Compounds.

Determination of Proper Method for Installing and Connecting Aerial Loading Coils.

Development of a Method for Making Phantom Circuit Transpositions.

Development of Methods for Making Pole Pair Phantom Transpositions.

Standardizing Methods of Long Span Construction for Open Wires.

Development of Electrolysis Bond Relay.

Development of an Improved Method for Testing Galvanizing on Iron and Steel.

Development of Improved Strain Insulators for Pole Guys.

Design of and Specifications for Tool Box for Cable Splicers and Small Maintenance Gangs.

Outside Plant Matters—Continued

Revision of Specifications for Vitrified Clay Duct to Enable the Utilization of a Greater Proportion of the Total Factory Output with a Saving in Cost.

Standardization of Hall Terminal for Use Inside of Buildings.

Development of Methods for Reinforcing Pole Butts.

Efficiency Tests of Commercial Forms of Patent Guy Anchors and Selection of the Most Serviceable Forms for Standardization.

Development of a Cheaper Crossarm Brace.

[fol. 15602] Development of Standard Specifications for Underground Conduit Construction Embodying Improved Practices.

Investigation Resulting in Reduction in Diameter and Cost of Standard Underground and Aerial Cables.

Standardizing Methods of Installing Underground Cables.

Development of Trouble Locating and Test Sets for Cable Repairmen and Cable Splicers.

Revision of Specifications for Splicing Cables to Cover New and Improved Methods.

Determination of Best Methods for Making Joints in Iron Wire.

Investigation of the Economy of Latticed Steel Poles.

Development of a New Aerial Type of No. 22 B & S. Gauge Cable.

Preparation of Specifications for High Strength Toll Aerial Cable Lines.

Determination of Best Method of Terminating Paper Insulated Cables at Central Office or Inside Buildings.

Improvement in Outside Distributing Terminals.

Development of Improved and Cheaper Type of Protected Cable Terminal.

Studies of Possible Modifications and Economies in Standard Line Construction for Use where Weather Conditions are Not Severe.

Study of Construction to be Proof Against Very Severe Storm Conditions.

Revision of Specifications for Exchange Aerial Construction.

Outside Plant Matters—Continued

Connecting Sleeves for Copper Wire.

Revision of Instructions Governing the Use of Dynamite.

Investigation of Alternative Forms of Insulator Pins.

Investigation of the Merits of Dry Galvanizing for Use on Pole Line Hardware.

Investigation to Determine the Best Materials and Methods for Insulating Joints in Rubber Covered Wire.

Improvements in Insulated Wires and in Interior Locations.

[fol. 15603] Investigation of the Comparative Economies of Different Materials Used for Supporting Aerial Cables.

Revision of Specifications for Joint Use of Poles by Telephone and Light and Power Companies.

Specifications for Placing House Cables.

Revision of Specifications for Creosoted Yellow Pine Poles and Reinforcing Stubs.

Development of High Dielectric Strength Strain Insulators.

Standardization of Plant Engineering Records.

Investigation of the Available Formulae for Calculating the Stability of Poles Set in Earth.

Revision of Specifications for Block Wiring.

Switch for Making Transpositions in Working Open-Wire Circuits.

Development of Thimble Guy Rod.

Improved Line Insulator.

Bulletin on Results of Pole Treatment.

Connecting Blocks for Toll Cable Terminals.

Development of Test Connectors.

Preparation of Bulletin on Electrolysis Mitigation.

Bulletin on Sags and Tensions of Suspension Strands.

Development of Specifications for 17 Gauge Bronze Outside Distributing Wire.

Effects of Stray Currents on Paper Insulation of 24 Gauge Cables.

Resistance of Cable Sheaths.

Outside Plant Matters—Continued

Investigation of Sealed Chamber Terminal for Junction of Open-Wire Lines and Cables.
Study of Angle Insulator.
Ground Connections.
Reinforced Concrete Crossarms.
[fol. 15604] Study of Sleet Storm Conditions in the United States.
Development of Combination Guy and Suspension Clamp.
Cable Splicers' Test Set for Use in Machine Switching Exchanges.
New Method of Crating Loading Coils.
New Method of Marking Terminals.
New Method of Installing Apparatus Needed at Junction of Cable and Open-Wire Lines Used for Carrier.
Development of Improved Forms of:
Grade Clamp.
Bridle Wire Insulation.
Houseline.
Cable Clamps.
Clamps for Ground Wires.
Strain Plates.
Guy Rods.
Pipe Straps.
Shovels and Digging Spoons.
Porcelain Tubes.
Aerial Cable Splicer's Tent.
Balconies for New Type Cable Terminals.
Pole Seat.
Bridle Rings.
Cable Extension Arms.
Reinforcing Strap.
Transposition Running Board.
Furnace Shields.
Porcelain Strain Insulators.
Wax Thermometer.
[fol. 15605] Guy Chains.
Tinned Steel Sleeves.
Messenger and Guy Strand.
Iron Wire.
Rock Guy Bolts.

Outside Plant Matters—Continued

Pipe Cap Molds.
Lineman's Body Belt and Safety Strap.
Guy Guards.
Clamps for 2200 Pound Strand.
Pole Steps—Long Head.
Manhole Frames and Covers.
Cant Hooks.
Conduit Castings.
Strain Insulator Clamps.
Pole Jacks.
Pike Poles.
Fanning Strips.
Terminal Tag.
Terminal Clamps.
Renumbering Strips.
Binding Posts.
Terminal Drip Pan.

[fol. 15606] Transmission and Protection Matters:

Interference to Telephone Lines from High Speed Telegraph Circuits.
Interference from High Tension Transmission Lines Having Grounded Neutrals.
Experimental Determination of Crosstalk on Transposed Lines.
Preparation of a Bulletin on Noise and Inductive Disturbances.
Transmission Losses, Common and Local Battery Sets.
Determination of Reflection Losses.
Dielectric Losses in Paper Cable.
Determination of Attenuation and Reflection Constants of Loaded Cable.
Development of Duplex Cable.
Experimental Determination of Possibilities of Telegraphing Through Cables.
Design of Submarine Loading Coils and Pots for Loading Three Important Submarine Cables.
Design and Development of Cable and Loading Coils for the Underground System Between Boston and Washington.
Development of Improved Condensers.

Transmission and Protection Matters—Continued

Improvement of Insulation of Open-Wire Circuits.
Portable Bridge for Measuring the Impedance of Telephone Circuits and Apparatus with High Frequency Currents.
Systems of Transpositions for Phantom Circuits.
Loading No. 8 Gauge Circuits.
Investigation of Vacuum Arresters for Telephone Protection.
Transposition System for Joint Telephone and Telegraph Lines.
Determination of Resistance Limit for Central Office Ground.
Phantoming of Loaded-Circuits.
Use of Amplifiers in Telephone Measurements.
Development of Transmission Measuring Set for Routine Use.
Development of Telephone Repeaters for Commercial Use.
[fol. 15607] Special Field Trial of Long Distance Wireless Telephone and Telegraph.
Development of Phantom Circuit Repeating Coils.
Studies of Phantom Loading Coil Design.
Development of Equipment for Phantoming Rural Subscribers' Lines.
Improvement in Terminal Cables for Duplex Loading Coil Cases.
Studies of Special Irons for Use in Loading Coil Cores.
Development of Improved Induction Coils.
Development of Autotransformers for Duplex Circuits.
Development of Test Sets for Measuring Alternating Current Constants of Coils in the Field and for Demagnetizing Magnetized Coils.
Development of Improved Repeating Coils having High Stability and High Grade Ringing and Transmission Efficiency.
General Development of Improved Types of Loading Coils and Pots for Use on Open-Wire Lines, Large Gauge Cables and Small Gauge Cables.
Development of Coils for Composite Sets.
Development of Coils for Polar Duplex Sets.

Transmission and Protection Matters—Continued.

Development of Coils for Morse Generator Taps.
Development of Shielded Phantom Repeating Coils.
Field Experiments on Improved Substation Protector.
Improved Alarm Fuses.
Improvement of Central Office Heat Coils.
Improvement of Fuses Used for Substation Protection.
Redesign of Central Office Main Frame Protector.
Development of Method for Cleaning Carbon Protector Blocks so as to Reduce the Cost of Maintenance.
Transmission Improvement of Heat Coils for Magneto Offices.
Development of Protective Apparatus for Use on Telephone Lines Leased for the Operation of Foreign Signaling Systems.
Preparation of Bulletins on Transmission Equivalents.
Development of Improved Compensating Transformers.
[fol. 15608] Development of Apparatus and Methods for Detecting Abnormal Resistance at Heat Coil Contracts and for Reducing Such Resistance.
Preparation and Distributon of Handbook of Standard Transposition Systems.
Cooperating with Engineers of N. Y., N. H. & H. R. R. Co. and Westinghouse Co. in Reducing Interference from Electrified Railway.
Application of Compensating Transformers to Telephone Circuits for the Purpose of Reducing Electromagnetic Interference from Paralleling Single-Phase Railway Systems.
Regulator for Potentials of Ground Connections.
Preparation and Distribution of a Set of Notes on Transmission Maintenance.
Preparation of a Bulletin on Loading Telephone Circuits.
Transmission Work in Connection with Telephone and Telegraph Facilities Required by the United States Government, particularly for the Use of the Army and Navy.

Transmission and Protection Matters—Continued

Portable Composite Set.
Compensating Transformer — Improvement in Transmission Efficiency.
Non-Inductive Type Repeater Circuits.
Development of Loading Coils with Cores Having Air Gaps.
Attenuation Equalizer for Submarine Cables.
Re-design of Protector No. 61 and Protector Mounting No. 2.
Development of Noise Standard for Field Use.
New Retardation Coil for Artificial Line—Duplex Telegraph Set.
Transmission Losses Caused by Multipling Trunk Circuits.
Test of Filters as Lightning Protectors.
Use of Telephone Repeaters Equipped with Special Apparatus to Improve the Attentuation—Frequency Characteristics of Circuits.
Investigation of Heat Coil Protection of Magneto Substations.
[fol. 15609] Deterioration of Paper Condensers.
Development of High Efficiency Phantom Transformer Coils.
Network of No. 8 Gauge Circuits Equipped with Telephone Repeaters Connecting all Important Cities of the United States.
Use of Telephone Repeaters on Call Circuits.
Development of Improved Methods for Noise Investigations.
Development of Special Assembly Methods of Cable Loading Coils for Use on Four-Wire Telephone Repeafer Circuits.
Development of Loading Coils Suitable for "Carrier Current" Operation.
Inductive Disturbances from High Tension Lines.
Preparation of a Bulletin on Protection Against Foreign Potentials.
New Types of Loading Units for Phanton Loading.
Cable Loading Coils with Coils Having Air Gaps.
Grounding Aerial Cable Sheaths.

Work has also been completed on about 800 other subjects.

[fol. 15610] TOLL CASE—RHODES EXHIBIT 88

Some Cases of Work on Hand

(Plant Matters Only. Traffic and Commercial Problems Not Included)

Equipment Matters:

Automatic Service Testing Equipment (Multi-line Service Observing).
Central Office Battery Noises.
Small Toll Ticket Distributing System.
Fire Extinguishers.
Improved Head Band for Operator's Receiver.
Waterproof Switchboard Plugs.
Common Battery Circuits for Use in Duplex Cables.
Improved Composite Ringer.
New Wire Chief's Desk.
Improved Case and Cap for No. 144 Receiver.
Central Office Grounds and Ground Leads.
Improved Ringer for Common Battery and Magneto Service.
Improved Operating Room Desks.
Audible Signal for Use with Answering Supervisory Lamps.
Duplex Telegraph System for Loaded Cables.
Gas Engines.
Improved Signaling Method for Toll Circuits.
General Study of Telephone Receivers.
Regulation of Central Office Storage Battery Voltage.
Automatic Private Branch Exchange.
Development of Small Common Battery Switchboard.
Centralized Test Desk.
Improved Service Observing Plug.
[fol. 15611] Dry Battery for High Resistance Transmitters.
Improved Trunking Arrangements for Common Battery Manual Switchboards.
Sensitive Alternating Current Relay.
Energy Supply for Message Registers.
Central Test Desk for Locating Faults in Cables.
Improved Desk Stand.
Machine Switching Substation Equipment.
New Operator's Transmitter.

Equipment Matters—Continued

Apparatus for Determining the Efficiency of Transmitters, Receivers and Induction Coils.
Private Branch Exchange Equipment for Use with Full Mechanical Central Offices.
Development of Sound-Proof Telephone Booths.
Emergency Power Equipment for Small Offices.
Arrangement of Storage Batteries for Machine Switching Offices.
Power Equipment for the Selector in Machine Switching Offices of the Panel Type.
Mercury Arc Rectifiers for Machine Switching Offices.
Charging Machines and Accessory Equipment for Machine Switching Offices.
Improved Dial for Machine Switching.
Repairmen's Hand Set for Use in Machine Switching Exchanges.
Improvements in Storage Batteries and Accessory Equipment.
Ringing Interrupter for Magneto Offices.
Power Plants for Private Branch Exchanges.
Equipment Installed in Manual Offices to Handle Calls from and to Full Mechanical Offices.
Circuit and Apparatus Development for Full Mechanical Central Office Equipment of the Panel Type.
[fol. 15612] Maintenance Equipment and Methods for Full Mechanical Central Office Equipment of the Step-by-Step Type.
Improved 202 Type Selector.
Circuit Arrangements for Tandem Systems.
Development of Drive Mechanism for Panel Type Offices.
Development of Operators' Calling Devices.
Four-Wire Telephone Repeater Equipment for Long Toll Cables.
Four-Wire Telephone Repeater Equipment for Short Toll Cables.
Metal Stay Hooks and Solderless Tips for Desk Stand Cords.
Substation Installers' Leather Bag.
Substation Repairmen's Satchel.

Equipment Matters—Continued

Standard Saw for Substation Installers.
Linemen's Test Set No. 17—Improvements in Design.
Redesign of Standard No. 2 Booth.
Standard Tool for Removing Floor Boards.
Standard Cable Stripper for Small Diameter Cable.
Automatic Ribbon Shift for Calculagraphs.
Redesign of No. 43 Subscriber's Set for Housing Extension Ringers.
Development of Weather-proof Telephone Booth.
Development of Steel Telephone Booth.
Development of Special Booth for Use in United States Government Buildings.
Substation Equipment to Obtain Increased Ringing Range on Subscribers' Loops.
Call Circuit Maximum Facilities at "A" Positions.
Improved Intercommunicating System for Residence and Business Service.
Cable Splicer's Talking Set.
Substation Equipment for Deaf Persons.
[fol. 15613] Equipment for Training Operators in Handling Calls between Manual Central Offices and between Manual and Machine Switching Systems.
Service Observing Equipment for Telephone Company Commercial Offices.
Seals, Seal Presses and Locking Key Rings Used in Making Collections from Pay Stations.
Improved Baking Japan.

[fol. 15614] Outside Plant Matters:

Pole Butt Reinforcements.
Improvements in Connecting Blocks.
Trouble Locating Set for Cable Repairmen.
Improvements in No. 14 Cable Terminals.
Development of Improved Electrolysis Bond Relay Switch.
Cable Splicer's Test Set.
Investigation of Wiping Solder.
Work with the American Committee on Electrolysis.
High Dielectric Strength Underground Cable.
Study to Determine the Cause and Remedy for Ring Cuts.

Outside Plant Matters—Continued

Development of 27 Gauge Cable.
Insect Injury to Cable Sheath.
Amplifier and Exploring Coil for Locating Cable Troubles.
Portable Pole Treating Plant.
Preservation of Poles—Closed Cylinder Treatment.
Preservation of Poles—Open Tank Treatment.
Preservation of Poles—Brush Treatment.
Development of Strand Pulling Tool.
Development of Blackburn Clamping Devices.
Development of 3 and 1 Point Transposition Brackets.
Reducing the Capacity Unbalances in 22 Gauge and 24 Gauge Cables.
Development of 24 Gauge Cable for Aerial and Block Use.
Tests on Improved Line Insulating Devices.
Development of Watertight Plugs for Submarine Cables.
Development of a New Type of Concrete Pole.
Development of Bends for Pole Laterals.
[fol. 15615] Improved Pole Seat.
Development of Standard Tools and Appliances for Underground Cable Construction.
Development of First Aid Appliances and Materials.
Apparatus for Testing the Integrity of Cable Sheath and for Drying Cables which are in Use.
Improvement of Wooden Cable Terminal Boxes.
Overcoming Defects which Occasionally Occur with Present Methods of Making Wire Joints at Splices in No. 19 Gauge Cables Used for Phantom or Repeater Circuits.
Developing a Tool for Twisting Pair Joints in Cable Splicing.
Design of Pole Treating Plant.
Study of the Effect of the Temperature and Duration of the Heating Bath on the Strength of Open Tank Treated Timber.
Rawlplugs.
Standardization of Textile Insulated Lead Covered Cables.
Scrulix Guy Anchors.

Outside Plant Matters—Continued

Specifications for Submarine Cables.
Balancing Stubs and Building out Stubs.
Development of Steel Towers and Supports for Radio Purposes.
Development of anhole Locating Test Set.
Development of a Buzzer-Battery Test Set.
Improved Method of Attaching "B" Terminal Braces to the Box.
Improvements in Present Types of Underground—Aerial Cable Terminals.
Improvements in Present Types of Distributing Terminals.
Investigation of Sherardized Hardware.
Method of Strengthening Corner Joints in No. 23 Terminal Doors.
Specifications for Quadded Land Cables.
Specifications for Composite, Non-Quadded Cables.
[fol. 15616] Study of Matthews Spragun Painting Machine.
Development of Improved Method of Applying Insulating Material to Wires in Cables.
Improvements in Dielectric Strength of Cable Terminal Stubs.
Development of More Economical Distributing Frame Wire.
Development of More Economical Inside Wire.
Development of More Economical Bridle Wire.
Fibre Strength of Pole Timbers.
Investigation of Zeller Process.
Apparatus for Fuse Protection between Aerial and Underground Cables.
Cable Loading Coil Cases for Loading Units Containing New Phantom Coil No. 587.
Development of Built-up Crossarm and Pin System.
Stub Reinforcement for Poles—Strap Type.
Investigation of the Preservative "Aczol."
Use of Desilverized Lead in the Manufacture of Cable Sheath.
Multiple Unit Cable.
Capacitance Uniformity in Quadded Cables.
Development of Improved Forms of:
Aerial Cable Grips.

Outside Plant Matters—Continued

Manhole Lighting Set.
Linemen's Hammers.
Emergency Wire Reel.
Lead Sleeving.
Manhole Gaskets.
Manhole Guards.
Load Coil Supports.
Strand Cutter.
[fol. 15617] Paper Insulated Emergency Cable.
Wire Braids.
Motor Lubricating Oils.
Rubber Insulated Quadded Emergency Cable.
River Crossing Arms.
Insulator Pin Gauges.
Ladders.
Crossarm Spacing Blocks.
Cable Rings.
Tree Trimmers.
Draw Knife.
"Pull" Finder.
Pliers.
Rock Anchors.
Guy Shields.
Concrete Poles.
Duct Rodding Tools.
Vitrified Clay Conduit.
⅝ Inch Steel Pins.
Slack Puller.
Bridle Wire Insulator.
Solder Ladle.
Cable Bender.
Tool for Making Cable Ties.
Splicers' Furnaces.
Steel Numbering Die.
Splicers' Platforms.
[fol. 15618] Tackle Blocks.
Trouble Locating Set for Use on Open Wire Lines.
Bridging Connector.
Cross-Connecting Aerial Cable Terminal.
Tension Indicator for Support Strand.

[fol. 15619] Transmission and Protection Matters:

Improved Operator's Telephone Set.
Use of Auto-Transformers for the Reduction of Reflection Losses.
General Repeater Study.
Magnetization of Loading Coils.
Redesign of Substation Circuit.
Interference from High Voltage Direct Current Railways.
Interference from Single Phase Railways.
Study of Wireless Telephone and Telegraph Matters.
Transpositions for Parallel Power and Telephone Circuits.
Interference from Wireless Telegraph Stations.
Improved Open Space Cutout for Substation Protection.
Development of Portable Source of Variable High Frequency Currents.
Loading of Toll Entrance Cables.
Protectors for Potentials over 5,000 Volts.
Portable Loading Coil Test Sets.
Use of Four-Wire Telephone Circuits Equipped with One-Way Repeaters for Toll Cable Working.
Wave Shapes of Current and Voltages in Power Circuits.
Inequality Ratio Repeating Coils Having High Ringing Efficiency.
Study of the Characteristics of Speech.
Adjusting the Capacity of Loaded Cable for Repeater Operation.
Improvement of Transmission Efficiency of Central Office Heat Coils.
Multiplex Telephony and Telegraphy by the Use of Carrier Currents over Wires.
The Effect of Noise on the Intelligibility of Telephone Conversations.
[fol. 15620] Theoretical Study of Transients.
Uniform Transmitting and Receiving on Subscribers' Loops of Varying Length.
Field Investigation of "Flutter Effect."
Crosstalk in Cable Circuits.

Transmission and Protection Matters—Continued

Induction into Cable Circuits.
Investigation of the Amount and Distribution of Noise at Subscribers' Stations.
Transposition Systems and Special Conductor Arrangement for Open-Wire Circuits Carrying High Frequency Currents.
Balancing of Composite Sets for the Prevention of Noise and Crosstalk.
Investigation of Induction into Open Wire Circuits under Joint Use Conditions.
Methods for Determining the Transmission Efficiency of Substation Sets, Operators' Sets and Substation Loops in Service.
Use of Alternating Currents within the Voice Frequency Range for Signaling.
Investigation of the Magnitude and Distribution of Telephone Circuit Unbalances and of Their Effects on Noise.
Theoretical Studies in Wave Propagation.
Cable Loading Systems for Carrier Circuits.
Transmission Design of Call Circuits.
Loading Coils for Local Trunk Cables.
Transmission Design of Local Trunks.
Transmission Study of Machine Switching Systems.
Battery Supply Transformers for Local Cord Circuits.
Crosstalk Measuring Set.
Noise Meter.
Electrical Networks.
Clearing Grounds in Porcelain Type Open Cutouts, Using 200 Volt Breakdown Test.
[fols. 15621-15670] Low Voltage Vacuum Arrester.
Alternating Current Wave Analyzer.
High Frequency Crosstalk Measuring Set.
Reduction of Unbalance in Loading Coils.
Carrier Telegraph System for Cable Use—Transmission Features.
Reflection Reducing Transformers for Carrier Circuits.
Investigation of Practice of Bonding Aerial Cable Sheath to Underground Cable Sheath.

Transmission and Protection Matters—Continued

Inductive Interference Due to Transient and Low Frequency Currents and Voltages in Power Systems.
Cooperation with Inductive Interference Committee of American Railway Association.
Interference with Carrier Current Systems.
Effectiveness of Coordinated Power and Telephone Transpositions.
Relation of Noise at Circuit Terminals to Induction Measurements on Isolated Sections of Open Wire Lines.
Use of Earth Current Meter.
Development of Attenuation Equalizers for Short, Non-Loaded Cable Circuits—Transmission Features.
Fuse Protection Between Aerial and Underground Cables.
Transmission Design of P. B. X. Circuits.

Work is also on hand for more than 400 other subjects.

[fol. 15671] SERVICE CONNECTIONS CASE—COOPER EXHIBIT No. 6

The following indicates the average length of life in months for all classes of stations as computed in accordance with the two methods described heretofore, that is (a) terminated stations from January 1st, 1921 to May 31st 1921, inclusive, and (b) by analyzing 10% of the active stations, as of June 30, 1921.

	Average Life in Months			
	Cleveland	Columbus	Canton	Nelsonville
Terminated Stations	26.9	30.0	20.7	23.7
Active Stations	46.8	47.9	32.2	32.4

These data indicate that the rapid turnover of subscribers' stations is largely caused by the rapidity of movement within the short term class and emphasises the necessity for securing all reasonable protection against un-warranted service connection expense due to short term service users.

[fol. 15672]

COOPER EXHIBIT No. 9

SERVICE CONNECTIONS CASE

Cleveland Exchange

Summary of Expense Per Service Connection

	Commercial	Accounting	Traffic	Plant	Total
Establishing Service:					
1-Instruments not in place					
Main Station and PBX Trunk	1.57	.34	1.71	1.57	5.19
Extension and PBX Stations	.90	.13	....	.93	1.96
2-Instruments in place					
Main Station and PBX Trunk	1.57	.34	1.71	4.74	8.36
Extension and PBX Stations	.90	.13	....	2.80	3.83
Discontinuance of Service:					
Main Station and PBX Trunk	.87	.33	3.02	6.49	10.71
Extension and PBX Stations	.64	.13	....	4.88	5.65
Total Service Connections:					
1-Instruments not in place					
Main Station and PBX Trunks					15.90
Extension and PBX Stations					7.61
2-Instruments in place					
Main Station and PBX Trunk					19.07
Extension and PBX Stations					9.48

[fol. 15673]

SERVICE CONNECTIONS CASE—COOPER EXHIBIT No. 10

Columbus Exchange

Summary of Expense Per Service Connection

	Commercial	Accounting	Traffic	Plant	Total
Establishing Service:					
1-Instruments not in place					
Main Station and PBX Trunk	1.24	.16	.77	2.14	4.31
Extension and PBX Stations	.63	.13	....	.57	1.33
2-Instruments in place					
Main Station and PBX Trunk	1.24	.16	.77	1.86	4.03
Extension and PBX Stations	.63	.13	....	.63	1.39
Discontinuance of Service:					
Main Station and PBX Trunk	.66	.18	.94	3.82	5.60
Extension and PBX Stations	.44	.11	....	3.70	4.25
Total Service Connections:					
1-Instruments not in place					
Main Station and PBX Trunk					9.91
Extension and PBX Stations					5.58
2-Instruments in place					
Main Station and PBX Trunk					9.63
Extension and PBX Stations					5.64

[fol. 15674]

SERVICE CONNECTIONS CASE —COOPER EXHIBIT No. 11

Canton Exchange

Summary of Expense per Service Connection

	Commercial	Accounting	Traffic	Plant	Total
Establishing Service:					
1-Instruments not in place:					
Main Station and PBX Trunk	1.77	.21	.86	.98	3.82
Extension and PBX Stations	.92	.17	....	.60	1.69
2-Instruments in place:					
Main Station and PBX Trunk	1.77	.21	.86	2.02	4.86
Extension and PBX Stations	.92	.17	....	.79	1.88
Discontinuance of Service:					
Main Station and PBX Trunk	.98	.24	.53	5.22	6.97
Extension and PBX Stations	.57	.15	....	5.08	5.80
Total Service Connections:					
1-Instruments not in place:					
Main Station and PBX Trunk	....	....	....	....	10.79
Extension and PBX Stations	....	....	....	....	7.49
2-Instruments in place:					
Main Station and PBX Trunk	....	....	....	....	11.83
Extension and PBX Stations	....	....	....	....	7.68

[fol. 15675]

SERVICE CONNECTIONS CASE—COOPER EXHIBIT No. 12

Nelsonville Exchange

Summary of Expense Per Service Connection

	Commercial	Accounting	Traffic	Plant	Total
Establishing Service:					
1-Instruments not in place:					
Main Station and PBX Trunk	1.58	.19	.58	.16	2.51
Extension and PBX Stations		No data available.			
2-Instruments in place:					
Main Station and PBX Trunk	1.58	.19	.58	.98	3.33
Extension and PBX Stations		No data available.			
Discontinuance of Service:					
Main Station and PBX Trunk	1.19	.22	.30	4.29	6.00
Extension and PBX Stations		No data available.			
Total Service Connections:					
1-Instruments not in place:					
Main Station and PBX Trunk	....	....	....	....	8.51
Extension and PBX Stations		No data available.			
2-Instruments in place:					
Main Station and PBX Trunk	....	....	....	....	9.33
Extension and PBX Stations		No data available.			

[fol. 15676] SERVICE CONNECTIONS CASE—COOPER EXHIBIT No. 13

Wiring Loss

The item "Wiring Loss", may be briefly explained as follows:

At the time of making a new installation the labor and material used by the Plant Department at the applicant's premises, are charged to a Plant Account, i.e., are capitalized, and at the time are not expense. However, when the telephone is removed this item is credited to the Plant Account, so that capital at no time includes items for installation not actually in service. At the time of making this credit to capital, the salvaged part of the installation is charged to a material and supplies account, and the balance is charged to expense until such time as it is to be re-used. That part of the capitalized cost of a new installation, which cannot later be salvaged, therefore, may be considered a deferred expense item. This expense or loss is represented largely by labor.

When telephones are re-installed, i.e., when telephones are placed where old wiring is in place and usable, the value of the wiring in place (including the original labor involved) is credited to expense and charged to the proper plant account. The result is a constant succession of debits and credits to expense from this source, and the net balance during any given period, is the amount of realized expense out of the original total capitalized costs above referred to as deferred items of expense. The net amount of this expense divided by the number of removals during the period gives the average wiring loss per station removed, and is a separable item of expense clearly attributable to station movement.

This item of wiring loss is shown on the following table for the territory of the Ohio Bell Telephone Company as operated by the former Cleveland Telephone Co. and Ohio Division of the Central Union Telephone Company.

	Year 1921	Total for period Jan. 1, 1917 to Dec. 31, 1931, inc.
Gross Wiring Loss	$517,853	$1,683,207
Gross Wiring Credits	218,532	651,820
Net Wiring Loss	299,321	1,031,387
Stations discontinued	80,752	340,847
Wiring Loss per Station discontinued	3.71	3.03

NOTE.—The composite wiring loss for the five years (1917-1921 inc.) was used in determining disconnect expense.

[fols. 15677-15678] IN SUPREME COURT OF THE UNITED STATES

STATEMENT OF POINTS UPON WHICH APPELLANT INTENDS TO RELY AND DESIGNATION OF PARTS OF RECORD TO BE PRINTED, PURSUANT TO RULE 13 OF THE RULES OF THE SUPREME COURT OF THE UNITED STATES—Filed November 20, 1936

The Ohio Bell Telephone Company, appellant in the above entitled cause, states that the points upon which it intends to rely in its appeal in said cause are as follows:

Use of Price Trends

(Assignments of Error Numbers 1, 2 and 3)

The Commission's valuation of appellant's intrastate property as of June 30, 1925 was based upon an inventory and appraisal. In contrast, for each of the years 1926 to 1933 the Commission fixed the value of appellant's property by the application of a price trend percentage to the total value of the intrastate property for the preceding year, plus net additions.

[fol. 15679] The valuations so arrived at for each of the years 1926 to 1933 deprived appellant of its property without due process of law in violation of the Fourteenth Amendment because:

(a) The valuations were fixed not by the exercise of judgment but by an arbitrary formula;

(b) The price trends were based on secret information, obtained from various sources, undisclosed to appellant and not offered or introduced in evidence;

(c) Appellant's written requests to examine and rebut this secret information were denied.

The amount of refunds was determined by a consideration of the Commission's value of appellant's property, its net income and fair rate of return in each such year. Thus, the Commission's value of appellant's property was one of the controlling factors in determining whether there should be refunds and if so, to what extent. Of the total refunds ordered, $10,462,787, with interest, represented claimed excess earnings for the years 1926 to 1932, inclusive, for which years the value of appellant's property was fixed by the use of the price trends referred to.

Disallowance of Expenses

(Assignments of Error 4, 5 and 6)

In finding appellant's net income for each of the years 1925 to 1933 the Commission excluded from appellant's allowable operating expenses large sums on account of (a) [fol. 15680] the annual expense of depreciation and (b) payments to the American Telephone and Telegraph Company for license contract services.

The Commission's action in these respects was arbitrary, unsupported by the evidence and amounted to a denial of due process of law in that:

(a) Depreciation Expense:

The Commission purported to base its allowance for the annual expense of depreciation upon appellant's retirement experience, that is, the cost of plant retired, less salvage. It used for such purpose appellant's net retirement losses for the three years and nine months immediately preceding June 30, 1925 and wholly disregarded appellant's known retirement losses experienced during the years 1925 to 1933, the period for which appellant's rates were under investigation. As the result, the Commission's allowance for the annual expense of depreciation was $8,067,266 less than the net cost to appellant of its intrastate plant retirements during the period for which the allowance was made.

The Commission's allowance for depreciation was also made in disregard of the evidence, which fully established the propriety of appellant's depreciation rates, based on the service live and salvage of its several classes of plant.

It was erroneous to base the amount of appellant's annual [fol. 15681] depreciation expense upon its retirement experience but if that basis was to be adopted, there was no justification for requiring appellant to absorb without reimbursement more than $8,000,000 of retirement losses due to the consumption of plant during said period.

If the retirement method of determining the annual expense of depreciation is to be used and depreciation accounting abandoned, no substantial reserve for depreciation is contemplated or will be created. In such event appellant should be permitted to earn on an undepreciated rate base.

(b) License Contract Payments:

Of appellant's total payments to American Telephone and Telegraph Company for 1925 to 1932, inclusive, for license contract services, the Commission disallowed more than $2,800,000 although the proof showed that the services were needed by and of benefit to appellant, and that the cost to the American Company of rendering such services was greater than such payments.

Refunds Improperly Ordered

(Assignments of Error Numbers 7 and 8)

The Commission's error in this respect was two-fold.

[fol. 15682] (a) Except for the undervaluation of appellant's property, the overstatement of its net income and, for 1926 and thereafter, the use of price trends based on secret information, no refunds could have been ordered.

(b) During the period covered by the Commission's refund orders a part of appellant's increased rates had been collected under bond conditioned to repay the portion of the increases found to be excessive. Under Ohio law no refunds could be ordered except with respect to appellant's rates thus collected. The amount of the refunds was determined arbitrarily, not with regard to the fair value of appellant's property and its net income referable to rates collected under bond, but by the use of accounting apportion-

ments bearing no relation to such value or net income. Thus, in making these apportionments, the Commission treated as bonded revenue more than $100,000,000 which was not in fact so collected and thereby required appellant to refund more than $4,000,000 of non-bonded revenue.

Further, as the result of this method refunds amounting to $409,127 were ordered in the toll system for 1925 and 1926 without any consideration of fair value of the toll property or the net income therefrom.

The method used was purely arbitrary, was arbitrarily [fol. 15683] applied in disregard of the evidence and resulted in a denial of due process.

Refusal To Fix Future Rates

(Assignments of Error Numbers 9 and 10)

The Commission's sole authority for the commencement of the company-wide inquiry is Section 614-23 of the General Code of Ohio, which authorizes the fixing of rates for the future only.

Although the Commission found that under its then existing rates, including those collected under bond, appellant had had excess earnings in each of the years 1925 to 1932 and ordered refunds for those years, it found that for the year 1933, the closing year of the investigation, appellant had had no excess earnings under such rates.

Nevertheless the Commission refused to approve appellant's then existing rates as its lawful rates for the future and summarily overruled appellant's written requests so to do.

The Commission having found facts requiring it to approve appellant's existing rates, its refusal to do so was a denial of due process.

Valuation

(Assignments of Error Numbers 11, 12 and 13)

The Commission's valuation of appellant's intrastate [fol. 15684] property was confiscatory in the following particulars:

(a) Omitted Real Estate:

On June 30, 1925 appellant owned seven parcels of real estate of an admitted value in excess of $500,000 purchased

as sites for telephone exchange buildings. Although on some of the parcels telephone buildings were then under construction and although all of them had been purchased before, and were within a reasonable time after June 30, 1925, actually used in appellant's telephone business, the Commission excluded all of the parcels from the rate base as of that date.

(b) Price Trends:

By adopting and applying the price trends above referred to the Commission evidently gave full weight to every fluctuation in price levels occurring between 1925 and 1933. Appellant's property could not be lawfully so valued. It resulted in a substantial undervaluation.

(c) Going Value:

In the finding of tentative value the Commission made a separate allowance of approximately $3,500,000 for the going value of appellant's property. In the finding of final value the Commission wholly eliminated this allowance and made no other allowance therefor. The existence of going value was established by competent evidence and admitted [fol. 15685] by the Commission. Failure to give recognition to this element of value either as a separate item or otherwise resulted in a denial of due process.

(d) Western Electric Prices:

The Commission found that the prices charged appellant by Western Electric Company for telephone apparatus were reasonable except for one price increase of approximately 10% effective November 1, 1930. The evidence showed and the Commission found that the profits made by Western in its Bell business were reasonable. The evidence also showed that the price increase of November 1, 1930 was necessary because Western, after having reduced its prices steadily during the years in controversy, had made a further price reduction in 1929 based upon an expected increase in business which did not develop.

What weighting was given to Western's prices in the Commission's trended property values for the years 1926 to 1933 is not disclosed, but it is apparent that for those years the Commission gave some weight to Western's decreasing prices and none to the necessary increase of November 1, 1930.

(e) Cost and Reproduction Cost:

The Commission in its valuation failed to give proper weight either to the reproduction cost new or to the actual cost of the property.

[fol. 15686] Overruling Appellant's Protests, Applications For Rehearing and Requests

(Assignment of Error Number 15)

Appellant filed with the Commission its protests and applications for rehearing with respect to each of the orders of the Commission. It also filed with the Commission three requests for leave to examine and rebut the undisclosed information on which the Commission's price trend percentages for the years 1926 to 1933 were based and three requests that the Commission fix its then existing rates as the just and lawful rates for the future. In these protests, applications for rehearing and requests appellant pointed out specifically the foregoing errors committed by the Commission and asserted that by reason thereof appellant had been deprived of its property without due process of law and denied the equal protection of the laws in violation of the Fourteenth Amendment to the Constitution of the United States.

Designation of Parts of Record to Be Printed

Appellant further says that the parts of the record necessary for the consideration of the foregoing points and hereby designated for printing are as follows:

(1) All of the papers filed and orders entered to perfect an appeal of this cause to the Supreme Court of the United States, including:

[fol. 15687] (a) The petition for appeal (transcript* pages 19-22).

(b) The assignment of errors (transcript pages 23-31).

(c) The jurisdictional statement (transcript pages 32-52) setting forth the grounds upon which it is contended the Supreme Court of the United States has jurisdiction on appeal, omitting appendices A (transcript pages 53-116) and

*All page reference are to pages of the transcript as numbered by the Clerk of the Supreme Court of Ohio Consecutively from 1 to 15,676 inclusive.

B (transcript pages 117-189) thereto which are the same as items (2) (g) and (14) of this designation.

(d) The order allowing appeal (transcript pages 190-192).

(e) Statement to appellee calling its attention to Rule 12, paragraph 3 of the rules of the Supreme Court of the United States and the proof of service upon appellee of all of the foregoing papers (transcript pages 193-194).

(f) The citation to appellee and the return made thereon (transcript pages 195-196).

(g) Appellant's praecipe (transcript pages 197-249).

(h) Stipulation No. 1 entered into between the parties with reference to the elimination of certain issues and of certain evidence from the record upon appeal (transcript pages 250-251).

(i) Stipulation No. 2 entered into between the parties with reference to the inclusion in the record on appeal of certain of the exhibits from the so-called Chicago case in abbreviated form (transcript pages 252-253).

[fol. 15688] (j) Stipulation No. 3 entered into between the parties with reference to the proceedings in and the bonds given in the several separate rate proceedings before the Public Utilities Commission of Ohio which were consolidated by said Commission into Case No. 3307 upon its docket (transcript pages 254-297).

(k) Stipulation No. 4 entered into between the parties with reference to the elimination of certain evidence from the record as printed (transcript page 298).

(l) Any other stipulations filed in this cause.

(m) The bond for costs required by the order allowing appeal and the approval thereof (transcript pages 307-312).

(n) The supersedeas bond required by the order allowing appeal and the approval thereof (transcript pages 299-306).

(o) This statement of points upon which appellant intends to rely and designation of parts of record to be printed.

(p) Any designation of parts of record to be printed filed by appellee.

(2) The record of the proceedings in said cause before the Supreme Court of Ohio including:

(a) The docket and journal entries in said court in Causes numbered 24694, 24695, 25023 and 25065 (transcript pages 2-17).

(b) Petition in error in Cause No. 25065, as certified, including the exhibits thereto attached (transcript pages 316-715).

[fol. 15689] (c) Petition in error in Cause No. 25023 (Consolidated into Cause No. 25065), as certified, including the table of exhibits but omitting the exhibits thereto, all of which are included among the exhibits to petition in error No. 25065 (transcript pages 716-772).

(d) Petition in error in Cause No. 24695 (Consolidated into Cause No. 25065), as certified, including the table of exhibits but omitting the exhibits thereto, all of which are included in the exhibits to petition in error No. 25065 (transcript pages 773-798).

(e) The petition in error in Cause No. 24694 (Consolidated into Cause No. 25065), as certified, including the table of exhibits but omitting the exhibits thereto, all of which are included in the exhibits to petition in error No. 25065 (transcript pages 799-838).

(f) The order of the Supreme Court of Ohio consolidating said causes numbered 24694, 24695, 25023 and 25065 into Consolidated Cause No. 25065 (transcript pages 4-5, line 18).

(g) The opinion of the Supreme Court of Ohio deciding Consolidated Cause No. 25065 (transcript pages 839-902).

(h) The journal entry and mandate of said court entered upon such decision (transcript pages 8 beginning with line 15 and ending on page 9, line 12).

(i) Appellant's application for a rehearing (transcript pages 903-921).

(j) The order of said court denying the application for rehearing (transcript page 9, lines 13-19).

[fol. 15690] (3) The complete transcript of the docket entries of the Commission in Cause No. 3307, being a company-wide inquiry with respect to appellant's rates and services, entitled: "In the Matter of the Investigation and Inquiry of The Public Utilities Commission of Ohio Upon Its Own Motion, for Determination (a) Of the value of the property of The Ohio Bell Telephone Company toll and exchange, (b) of the just and reasonable rates, and (c) of reasonable rules and regulations for service furnished by said company to its patrons throughout the State of Ohio" as contained in the record of this cause before the Supreme Court of Ohio (transcript pages 922-947).

(4) A complete transcript of the docket entries of the Commission in each of the Advanced Utility Rate Proceeding cases consolidated by said Commission with said company-wide case No. 3307 (transcript pages 978-1027).

(5) A complete transcript of the docket entries of the Commission in each of the so-called S cases, being separate cases consolidated into said case No. 3307 (transcript pages 948-966).

[fol. 15691] (6) A complete transcript of the docket entries of the Commission in case No. 3181, sometimes known as the "Hubbard Complaint" and consolidated into said case No. 3307 (transcript page 967).

(7) A complete transcript of the docket entries of the Commission in case No. 1368 relating to telephone rates in Columbus, Ohio, and consolidated into said case No. 3307 (transcript pages 968-970).

(8) A complete transcript of the docket entries of the Commission in case No. 1900 relating to telephone rates in Columbus, Ohio, and consolidated into case No. 3307 (transcript pages 971-974).

(9) A complete transcript of the docket entries of the Commission in case No. 1728 known as the "Service Connection Charge Case" and consolidated into said case No. 3307 (transcript pages 975-977).

(10) The order of the Commission of October 14, 1924, instituting the company-wide investigation No. 3307 and consolidating therewith the then pending separate cases (transcript pages 1028-1033).

[fol. 15692] (11) The Commissions tentative finding of January 10, 1931 (transcript pages 1034-1063).

(12) The Commission's order of January 10, 1931, tentatively fixing value (transcript pages 1064-1068).

(13) The protest of appellant filed with the Commission February 7, 1931, to the order of January 10, 1931, tentatively fixing value (transcript pages 1069-1072).

(14) The Commission's finding of January 16, 1934 (transcript pages 1073-1145).

(15) The Commission's order of January 16, 1934 (transcript pages 1146-1151).

(16) Appellant's application, filed with the Commission February 6, 1934, for rehearing of the Commission's order of January 16, 1934 (transcript pages 1152-1176).

(17) The application and request of appellant filed with

the Commission on February 17, 1934 (transcript page 1177).

(18) The Commission's order of March 1, 1934 (transcript pages 1178-1181).

[fol. 15693] (19) Appellant's application, filed with the Commission March 19, 1934, for rehearing of the Commission's order of March 1, 1934 (transcript pages 1182-1212).

(20) The Commission's order of March 9, 1934, overruling appellant's application for rehearing of the order of March 1, 1934 (transcript page 1213).

(21) The Commission's order of July 5, 1934 (transcript pages 1214-1217).

(22) The Commission's order of July 9, 1934 (transcript page 1218).

(23) The application and request of appellant of July 31, 1934, with respect to the Commission's order of July 5, 1934 (transcript pages 1219-1226).

(24) The application and request of appellant of July 31, 1934, with respect to the Commission's order of July 9, 1934 (transcript pages 1227-1230).

(25) The verified return of appellant, filed with the Commission July 31, 1934, to the order to show cause contained in the Commission's order of July 5, 1934 (transcript pages 1231-1285).

[fol. 15694] (26) The verified return of appellant, filed with the Commission July 31, 1934, to the order to show cause contained in the Commission's order of July 9, 1934 (transcript pages 1286-1339).

(27) Appellant's protest and application, filed with the Commission July 31, 1934, for rehearing of said orders of July 5 and 9, 1934 (transcript pages 1340-1382).

(28) Appellant's protest and application for rehearing filed with the Commission August 29, 1934 (transcript pages 1383-1388).

(29) The Commission's order of September 6, 1934 (transcript pages 1389-1394).

(30) Appellant's application and request of September 25, 1934, with respect to the Commission's order of September 6, 1934 (transcript pages 1395-1401).

(31) The Commission's order of September 27, 1934 (transcript pages 1402-1403).

[fol. 15695] (32) Appellant's protest and application, filed with the Commission October 1, 1934, for rehearing of

the Commission's order of September 6, 1934 (transcript pages 1404-1459).

(33) The Commission's order of October 19, 1934, overruling appellant's application and protest with respect to said order of September 6, 1934 (transcript page 1460).

(34) The stipulation filed with the Commission December 20, 1932, wherein there was stipulated into the record in Cause No. 3307 certain evidence and exhibits theretofore introduced in the so-called Chicago case entitled "Illinois Bell Telephone Company, plaintiff vs. G. Gale Gilbert et al., defendants", in the District Court of the United States for the Northern District of Illinois, Eastern Division, it being cause No. 3746 in said court (transcript pages 1461-1464).

(35) Include in said printing the entire transcript of the oral testimony in the company-wide case (transcript pages 1465-6238) otherwise known as "In re: Investigation and Inquiry of the Public Utilities Commission of Ohio upon its own motion for the determination of the value, rates, [fol. 15696] rules and regulations for service furnished by The Ohio Bell Telephone Company" and numbered 3307 on the docket of said Commission, omitting only the testimony of Frank R. McBerty which appears on the following pages of the transcript as certified:

Beginning with line 1, page 4736, and ending at the bottom of page 4852;

Beginning with line 1, page 4885, and ending at the bottom of page 4957;

Beginning with line 1, page 5233, and ending at the bottom of page 5333;

Beginning with line 1, page 5406, and ending at the bottom of page 5474.

(36) Also include in said printing the entire transcript of the stipulated oral testimony from the Chicago case (transcript pages 6239-7869) entitled "Illinois Bell Telephone Company vs. Gilbert" appearing in the printed volume known as "Abstract", omitting only:

[fol. 15697] (a) The testimony of Lambert N. Whitney beginning on page 6303 and ending on page 6307.

(b) The testimony of Allen B. Crunden beginning on page 6308 and ending on page 6316.

(c) The testimony of G. W. Cummings beginning on page 7125 and ending on page 7275.

(d) The testimony of J. G. Wray beginning on page 7542 and ending on page 7626.

(e) The testimony of Robert W. Burgess appearing on page 7863.

(37) Include in said printing the entire transcript of oral testimony in the so-called toll case, (transcript pages 7870-9716) otherwise known as Advanced Utility Rate Proceeding No. 124 on the docket of said Commission and entitled: "In re: Proposed Increased Rates and Charges of The Ohio Bell Telephone Company for Telephone Toll Service Between Points in the State of Ohio Filed to Become Effective January 21, 1924" which was consolidated into said company-wide case No. 3307, omitting only the testimony of W. F. Sloan beginning on page 8459 and ending on page 8579 of the transcript as certified.

(38) Include also in said printing the testimony of Charles P. Cooper, pages 9941 to 9978, inclusive, of the transcript as certified (hearing of February 2, 1922, part 2), [fol. 15698] in the so-called "Service Connection Charge Case", being No. 1728 on the docket of said Commission entitled: "In the Matter of the Investigation by the Commission Upon Its Own Initiative In re: Service Connection Charges and Charges for Moves and Changes of Telephone Companies" which was consolidated by said Commission into said company-wide case No. 3307.

(39) Include also in said printing the following exhibits or portions thereof from said company-wide case No. 3307:

Allensworth Exhibit 1 (transcript pages 10,095-10,097).
Allensworth Exhibit 3 (transcript pages 10,162-10,237).
Allensworth Exhibit 4 (transcript pages 10,238-10,301).
Anthony Exhibit A4 (transcript page 10,311).
Brett Exhibit 1 (transcript pages 10,312-10,318).
Brett Exhibit 2 (transcript pages 10,319-10,324).
Brett Exhibit 3 (transcript pages 10,325-10326).
Brett Exhibit 4 (transcript pages 10,327-10,328).
[fol. 15699] Brett Exhibit 5 (transcript pages 10,329-10,335).
Brett Exhibit 6 (transcript page 10,336).
Brett Exhibit 7 (transcript page 10,337).
Brett Exhibit 8 (transcript pages 10,338-10,350).
Brett Exhibit 9 (transcript pages 10,351-10,359).
Company Exhibit A (transcript page 10,789).

Company Exhibit X2 (transcript page 10,790).
Company Exhibit X3 (transcript pages 10,791-10,792).
Company Exhibit AA1 (transcript pages 10,793-10,795).
Company Exhibit AA2 (transcript page 10,796).
Company Exhibit AA3 (transcript pages 10,797-10799).
Commission Exhibit A1A (transcript pages 10,800-10,808).
Cooper Exhibit A1 (transcript pages 10,809-10,810).
Cooper Exhibit A2 (transcript pages 10,811-10,812).
Cooper Exhibit A3 (transcript page 10,813).
Cooper Exhibit A4 (transcript pages 10,814-10,835).
Cooper Exhibit A5 (transcript page 10,836).
Cox Exhibit A1 (transcript pages 10,847-10,866).
Cox Exhibit A2 (transcript pages 10,867-10,872).
[fol. 15700] Cox Exhibit A3 (transcript pages 10,873-10,884).
Cox Exhibit A4 (transcript page 10,885).
Cox Exhibit A5 (transcript page 10,886).
Cox Exhibit A6 (transcript pages 10,887-10,895).
Cox Exhibit A7 (transcript pages 10,896-10,901).
Cox Exhibit A8 (transcript pages 10,902-10,906).
Cox Exhibit A9 (transcript page 10,907).
Cox Exhibit A10 (transcript page 10,908).
Crunden Exhibit A1 (transcript pages 10,909-10,920).
Crunden Exhibit A2 (transcript page 10,921).
Crunden Exhibit A3 (transcript page 10,922).
Dorsey Exhibit 1 (transcript page 10,923).
Dorsey Exhibit 2 (transcript page 10,924).
Dorsey Exhibit 3 (transcript page 10,925).
Dorsey Exhibit 4 (transcript page 10,926).
Dorsey Exhibit 5 (transcript page 10,927).
Dorsey Exhibit 6 (transcript page 10,928).
Dorsey Exhibit 7 (transcript page 10,929).
Dorsey Exhibit 8 (transcript page 10,930).
[fol. 15701] Eide Exhibit 1 (transcript pages 10,931-10,981).
Eide Supplemental Exhibit 1 (transcript pages 10,982-10,983).
Eide Exhibit 2 (transcript page 10,984).
Eide Exhibit 3 (transcript pages 10,985-10,992).
Eide Exhibit 4 (transcript pages 10,933-10,999).
Gregory Exhibit 1 (transcript page 11,000).
Gregory Exhibit 2 (transcript pages 11,001-11,002).

Gregory Exhibit 3 (transcript page 11,003).
Gregory Exhibit 4 (transcript page 11,004).
Gregory Exhibit 5 (transcript page 11,005).
Gregory Exhibit 6 (transcript page 11,006).
Gregory Exhibit 7 (transcript page 11,007).
Hagenah Exhibit 1 (transcript pages 11,008-11,105).
Hagenah Exhibit 2 (transcript pages 11,106-11,246).
Hagenah Exhibit 3 (transcript page 11,247).
Hagenah Exhibit 4 (transcript page 11,248).
Hagenah Exhibit 5 (transcript page 11,249).
Hagenah Exhibit 7 (transcript pages 11,250-11,301).
Heiss Exhibit 9 (transcript pages 11,302-11,315).
[fol. 15702] Heiss Exhibit 10 (transcript pages 11,316-11,317).
Heiss Exhibit 11 (transcript page 11,318).
Heiss Exhibit 12 (transcript page 11,319).
Heiss Exhibit 13 (transcript page 11,320).
Heiss Exhibit 14 (transcript page 11,321).
Heiss Exhibit 15 (transcript page 11,322).
Heiss Exhibit 16 (transcript page 11,323).
Heiss Exhibit 17 (transcript page 11,324).
Heiss Exhibit 18 (transcript page 11,325).
Heiss Exhibit 19 (transcript page 11,326).
Heiss Exhibit 20 (transcript page 11,327).
Heiss Exhibit 21 (transcript page 11,328).
Heiss Exhibit 22 (transcript page 11,329).
Heiss Exhibit 23 (transcript page 11,330).
Heiss Exhibit 24 (transcript page 11,331).
Heiss Exhibit 25 (transcript page 11,332).
Heiss Exhibit 26 (transcript page 11,333).
Heiss Exhibit 27 (transcript page 11,334).
Hogan Exhibit 3 (transcript pages 11,335-11,346).
Hogan Exhibit 5 (transcript pages 11,347-11,370).
[fol. 15703] Hogan Exhibit 9 (transcript pages 11,371-11,420).
Hogan Exhibit 10 (transcript pages 11,421-11,422).
Kositzky Exhibit A1 (transcript pages 11,423-11,461).
Kositzky Exhibit A20 (transcript page 11,462).
Kositzky Exhibit A21 (transcript page 11,463).
Kositzky Exhibit A31 (transcript page 11,464).
Kositzky Exhibit A32 (transcript page 11,465).
Kositzky Exhibia A33 (transcropt page 11,466).
Kositzky Exhibit A34 (transcript page 11,467).

Kositzky Exhibit A35 (transcript page 11,468).
Morse Exhibit 1 (transcript pages 11,493-11,495).
Morse Exhibit 5 (transcript page 11,496).
Morse Exhibit 12 (transcript page 11,497).
Morse Exhibit 13 (transcript page 11,498).
Morse Exhibit 14 (transcript page 11,499).
Morse Exhibit 15 (transcript page 11,500).
Myers Exhibit 1 (transcript pages 11,501-11,511).
Myers Exhibit 3 (transcript pages 11,512-11,515).
[fol. 15704] Rhodes Exhibit A4 (transcript pages 11,529-11,541).
Rhodes Exhibit A5 (transcript pages 11,542-11,547).
Rhodes Exhibit A6 (transcript pages 11,548-11,550).
Schneider Exhibit 1 (transcript pages 11,551-11,694).
Schneider Exhibit 2 (transcript pages 11,695-11,702).
Schneider Exhibit 3 (transcript pages 11,703-11,852).
Schneider Exhibit 4 (transcript page 11,853).
Schneider Exhibit 5 (transcript page 11,854).
Schneider Exhibit 6 (transcript page 11,855).
Schneider Exhibit 7 (transcript page 11,856).
Schneider Exhibit 8 (transcript page 11,857).
Schneider Exhibit 9 (transcript page 11,858).
Schneider Exhibit 10 (transcript page 11,859).
Schneider Exhibit 11 (transcript page 11,860).
Schneider Exhibit 12 (transcript page 11,861).
Schneider Exhibit 13 (transcript page 11,862).
Schneider Exhibit 20 (transcript page 11,863).
Schneider Exhibit 21 (transcript page 11,864).
Stephens Exhibit 1 (transcript page 11,865).
Stephens Exhibit 2 (transcript page 11,866).
[fol. 15705] Stephens Exhibit 4 (transcript pages 11,867-11,875).
Stephens Exhibit 5 (transcript page 11,876).
Sloan Exhibit A1 (transcript pages 11,877-12,017).
Spring Exhibit 1 (transcript pages 12,018-12,019).
Uprichard Exhibit 1 (transcript pages 12,020-12,023).
Uprichard Exhibit 1A (transcript page 12,024).
Uprichard Exhibit 2 (transcript page 12,025).
Uprichard Exhibit 3 (transcript page 12,026).
Uprichard Exhibit 4 (transcript page 12,027).
Uprichard Exhibit 5 (transcript page 12,028).
Uprichard Exhibit 6 (transcript page 12,029).
Uprichard Exhibit 6A (transcript pages 12,030-12,031).
Uprichard Exhibit 6B (transcript page 12,032).

Uprichard Exhibit 6C (transcript page 12,033).
Uprichard Exhibit 6D (transcript pages 12,034-12,036).
Uprichard Exhibit 6E (transcript page 12,037).
Uprichard Exhibit 6F (transcript pages 12,038-12,040).
Uprichard Exhibit 6G (transcript page 12,041).
Uprichard Exhibit 13 (transcript page 12,042).
[fol. 15706] Uprichard Exhibit 14 (transcript page 12,043).
Uprichard Exhibit 15 (transcript page 12,044).
Uprichard Exhibit 16 (transcript page 12,045).
Williams Exhibit 1 (transcript page 12,046).
Williams Exhibit 2 (transcript page 12,047).
Williams Exhibit 3A (transcript pages 12,048-12,049).
Williams Exhibit 3B (transcript pages 12,050-12,058).
Williams Exhibit 7A (transcript pages 12,059-12,417).
Williams Exhibit 7B (transcript pages 12,418-12,673).
Williams Exhibit 7C (transcript pages 12,674-12,803).
Williams Exhibit 8 (transcript page 12,804).
Williams Exhibit 9 (transcript page 12,805).
Williams Exhibit 10 (transcript page 12,806).
Williams Exhibit 11 (transcript page 12,807).
Williams Exhibit 12 (transcript page 12,808).
Williams Exhibit 14 (transcript pages 12,809-12,814).
Williams Exhibit 16 (transcript page 12,815).
Wilson Exhibit 1 (transcript page 12,816).
[fol. 15707] Wilson Exhibit 2 (transcript page- 12,817-12,818).
Wood Exhibit 1 (transcript pages 12,819-12,822).
Wood Exhibit 2 (transcript page 12,823).
Wood Exhibit 3 (transcript page 12,824).
Wood Exhibit 4 (transcript page 12,825).
Wood Exhibit 5 (transcript page 12,826).
Wood Exhibit 6 (transcript page 12,827).
Wood Exhibit 7 (transcript page 12,828).
Wood Exhibit 8 (transcript page 12,829).
Wood Exhibit 9 (transcript page 12,830).
Wood Exhibit 9A (transcript page 12,831).
Wood Exhibit 9B (transcript page 12,832).
Wood Exhibit 10 (transcript page 12,833).
Wood Exhibit 11 (transcript page 12,834).
Wood Exhibit 12 (transcript page 12,835).
Wood Exhibit 13 (transcript pages 12,836-12838).
Wood Exhibit 14 (transcript page 12,839).

Wood Exhibit 15 (transcript page 12,840).
Wood Exhibit 16 (transcript page 12,841).
[fol. 15708] Wood Exhibit 17 (transcript page 12,842).
Wood Exhibit 18 (transcript page 12,843).
Wood Exhibit 19 (transcript page 12,844).
Wood Exhibit 20 (transcript page 12,845).
Wood Exhibit 21 (transcript pages 12,846-12,850).
Wood Exhibit 22 (transcript page 12,851).

Report to the Commission by E. W. Wood of August 11, 1934 (transcript pages 12,852-12,858).

(40) The following from the record of said cause No. 3307:

(a) Exhibits prepared by Richard H. Gregory in accordance with requests made at hearings of June 17 and 18, 1931 numbered 1 to 12 inclusive, 14 and 15, and 17 to 19 inclusive, and including of No. 1 both the original and the revised Exhibit; as certified (transcript pages 12,859-12,889).

(b) Exhibits prepared by Charles A. Heiss in accordance with request made at hearing of June 19, 1931 and numbered 1 to 4 (transcript pages 12,890-12,928) and 6 to 12 (transcript pages 13,017-13,033), in each instance inclusive (as certified, except that No. 5 (transcript pages 12,929-13,016) is to be omitted from the printing).

(c) Commission's order of April 22, 1932 with reference to the several requests of special counsel for the Commission (transcript pages 13,034-13,045).

[fol. 15709] (d) Response of Appellant of May 7, 1932 to Commission's order of April 22, 1932 (transcript pages 13,046-13,048).

(e) Appellant's additional responses numbered 5, 7, 10, 13a and 13b to said several requests (transcript pages 13,049-13,055).

(f) Exhibits showing gross additions to plant 1923 to 1931 and other data filed with the Commission November 2, 1932 in response to requests 1 to 5 of special counsel for the Commission of October 22, 1932 (transcript page 13,056).

(g) Responses to the Commission's request of August 24, 1933 including:

(1) Comparative Balance Sheet June 30, 1925 and June 30, 1932 (transcript page 13,331);

(2) Recapitulation of assets and liabilities June 30, 1925 and June 30, 1932 (transcript pages 13,332-13,333);

(3) Net additions June 30, 1925 to June 30, 1932 (including references to Commission's orders authorizing reimbursement of the treasury) (transcript page 13,334);

(4) Statement of mortgage notes assumed on property purchased (transcript page 13,335).

(h) Letter of September 15, 1933 from the Commission to Karl E. Burr, General Counsel for The Ohio Bell Telephone Company, requesting certain data; Mr. Burr's response of September 20, 1933 and the four accompanying statements as set forth in said letter (transcript pages 13,336-13,356).

(i) The letter of June 14, 1933 from the Commission to Karl E. Burr requesting 12 statements; Mr. Burr's response of June 21, 1933 and the 12 statements enclosed; and Mr. Burr's letter to the Commission of July 26, 1933 (transcript pages 13,357-13,382).

[fol. 15710] (j) A tabulation of 60 pages submitted to the Commission by appellant, as follows:

(1) Rates for exchange service transcript pages 13,383-13,430);

(2) Revisions in toll rates effective October 1, 1926 (transcript pages 13,431-13,437);

(3) Tariff schedules in effect January 1, 1934 not under bond (transcript pages 13,438-13,441);

(4) Tariff schedules in effect January 1, 1934 under bond (transcript pages 13,442-13,444);

(k) Appellant's monthly reports 2 to 6 inclusive as of November 30, 1933 (transcript pages 13,445-13,451).

(l) Revenue, expense and rate data filed April 17, 1934 in response to the Commission's order of March 1, 1934, together with the transmittal letter of The Ohio Bell Telephone Company addressed to the Commission of April 17, 1934 and the further letter of the Company to the Commission of the same date (transcript pages 13,452-13,761).

(m) Letter of August 12, 1933 from the Ohio Bell Telephone Company to The Public Utilities Commission of Ohio relative to the separate cases and the Commission's letter of acknowledgment of August 21, 1933 addressed to Karl

E. Burr, General Counsel of The Ohio Bell Telephone Company (transcript pages 13,762-13,763).

(n) Letter of December 22, 1933 from The Ohio Bell Telephone Company to The Public Utilities Commission and the Commission's acknowledgment of December 28, 1933 addressed to Karl E. Burr (transcript pages 13,764-13,765).

[fol. 15711] (o) Letter of The Public Utilities Commission to Karl E. Burr of March 23, 1933 and Mr. Burr's reply to Commissioner Geiger of April 3, 1933 transcript pages 13,766-13,767).

(41) Include also in said printing the following exhibits or extracts therefrom originally introduced in the case of Illinois Bell Telephone Company v. Gilbert, and by stipulation made part of the record in said Cause No. 3307, to-wit:

Exhibit A-66 (transcript pages 13,768-13,770).
" A-67 (transcript pages 13,771-13,773A).
" A-75 (transcript page 13,774).
" A-76 (transcript page 13,775).
" A-77 (transcript page 13,776).
" A-78 (transcript page 13,777).
" A-79 (transcript page 13,778).
" A-80 (transcript page 13,779).
" A-81 (transcript page 13,780).
" A-82 (transcript page 13,781).
" A-83 (transcript page 13,782).
" A-84 (transcript page 13,782).
" A-85 (transcript pages 13,783-13,784).
" A-86 (transcript pages 13,784-13,785).
" A-87 (transcript pages 13,785-13,786).
" A-88-B (transcript pages 13,787-13,788).
" A-90-B (transcript page 13,789).
" A-91 (transcript page 13,790).
" A-92 (transcript page 13,790).
" A-93B (transcript page 13,791).

[fol. 15712]

Exhibit A-94-B (transcript page 13,792).
" A-95-B (transcript page 13,793).
" A-96-B (transcript page 13,794).
" A-99 (transcript page 13,795).
" A-100 (transcript pages 13,796-13,799).
" A-101-B (transcript pages 13,800-13,802).

Exhibit A-103 (transcript page 13,803).
" A-108-B (transcript page 13,804).
" A-109 (transcript page 13,805).
" A-110 (transcript page 13,806).
" A-111 (transcript pages 13,806-13,807).
" A-112-B (transcript page 13,808).
" A-113-B (transcript page 13,809).
" A-115 (transcript page 13,831).
" A-116 (transcript pages 13,832-13,833).
" A-117-B (transcript page 13,834).
" A-118-B (transcript pages 13,835-13,850).
" A-119-B (transcript page 13,851).
" A-120 (transcript page 13,852).
" A-121-B (transcript page 13,853).
" A-123 (transcript page 13,855).
" A-124-B (transcript page 13,856).
" A-150-B (transcript page 13,860).
" A-151-B (transcript page 13,861).
" A-152-B (transcript page 13,862).
" A-153-B (transcript page 13,863).

[fol. 15713]

Exhibit A-154-B (transcript page 13,864).
" A-155-B (transcript pages 13,865-13,867).
" A-156-B (transcript page 13,868).
" A-157-B (transcript page 13,869).
" A-158-B (transcript page 13,870).
" A-159-B (transcript page 13,871).
" A-160-B (transcript page 13,872).
" A-161-B (transcript pages 13,873-13,875).
" A-162-B (transcript pages 13,876-13,877).
" A-163-B (transcript page 13,878).
" A-164 (transcript pages 13,879-13,882).
" A-165 (transcript page 13,882).
" A-166-B (transcript page 13,883).
" A-167-B (transcript pages 13,884-13,885).
" A-168-B (transcript page 13,886).
" A-169-B (transcript pages 13,887-13,888).
" A-170-B (transcript pages 13,889-13,893).
" A-171 (transcript page 13,894).
" A-172 (transcript page 13,895).
" A-174-B (transcript page 13,896).
" A-194 (transcript page 13,900).
" A-198 (transcript page 13,904).

Exhibit A-199 (transcript page 13,905).
" A-200-B (transcript page 13,906).
" A-201-B (transcript page 13,907).
" A-202 (transcript page 13,908).
" A-227 (transcript page 13,941).

[fol. 15714]

Exhibit A-228 (transcript page 13,942).
" A-229 (transcript pages 13,943-13,945).
" A-230 (transcript pages 13,946-13,947).
" A-231 (transcript pages 13,948-13,950).
" A-233 (transcript pages 13,951-13,955).
" A-256 (transcript page 13,959).
" A-257 (transcript pages 13,960-13,963).
" A-260 (transcript page 13,966).
" A-261 (transcript pages 13,966-13,968).
" A-271 (transcript page 13,982).
" D-19 (transcript page 13,983).
" D-27 (transcript page 13,985).
" D-28 (transcript pages 13,986-13,987).
" D-29 (transcript pages 13,988-14,002).
" D-30 (transcript page 14,003).
" D-31 (transcript page 14,004).
" D-32 (transcript pages 14,005-14,006).
" D-33 (transcript page 14,007).
" D-34 (transcript page 14,008).
" D-35 (transcript page 14,009).
" D-36 (transcript pages 14,009-14,010).
" D-38 (transcript pages 14,010-14,011).
" D-39 (transcript pages 14,011-13,012).
" D-41 (transcript page 14,012).
" D-42 (transcript page 14,013).
" D-46 (transcript page 14,014).
" D-48 (transcript page 14,016).
" D-49 (transcript page 14,017).

[fol. 15715]

Exhibit D-50 (transcript pages 14,017-14,018).
" D-51 (transcript pages 14,018-14,019).
" D-52 (transcript pages 14,020-14,022).
" D-53 (transcript page 14,923).
" D-54 (transcript pages 14,023-14,024).
" D-55 (transcript pages 14,024-14,025).
" D-56 (transcript page 14,026).
" D-61 (transcript page 14,027).

Exhibit D-62 (transcript page 14,028).
" D-63 (transcript page 14,029).
" D-69 (transcript page 14,034).
" D-72 (transcript pages 14,047-14,053).
" D-73 (transcript page 14,054).
" R-74 (transcript pages 14,055-14,061).
" D-77 (transcript pages 14,072-14,075).
" D-78 (transcript pages 14,076-14,077).
" D-79 (transcript page 14,078).
" D-81 (transcript page 14,079).
" D-82 (transcript pages 14,079-14,080).
" R-83 (transcript page 14,080).
" D-84 (transcript page 14,081).
" D-86 (transcript page 14,082).
" D-87 (transcript page 14,082).
" D-88 (transcript page 14,083).
" D-89 (transcript page 14,083).
" D-90 printing the first four pages only (transcript pages 14,084-14087).
" D-93 (transcript page 14,111).
" D-94 (transcript page 14,111).
" D-95 (transcript page 14,112).

[fol. 15716]

Exhibit D-96 (transcript page 14,112).
" D-97 (transcript page 14,112).
" D-99 (transcript page 14,113).
" D-100 (transcript pages 14,114).
" D-101 (transcript pages 14,115-14,121).
" D-102 (transcript pages 14,122-14,124).
" D-103 (transcript page 14,125).
" D-104 (transcript page 14,126).
" D-111 (transcript page 14,127).
" D-112 (transcript pages 14,128-14,132).
" D-116 (transcript pages 14,133-14,136).
" D-122 (transcript page 14,137).
" D-1-35 (transcript pages 14,138-14,140).
" D-136 (transcript page 14,141).
" D-137 (transcript pages 14,142-14,143).
" X-13-A (transcript page 14,144).
" X-14 (transcript pages 14,145-14,147).
" X-15 (transcript page 14,148).
" X-16 (transcript page 14,149).
" X-34 (transcript pages 14,150-14,151).

Exhibit X-35 (transcript pages 14,152-14,153).
" X-39 (transcript page 14,164).
" X-40 (transcript page 14,165).

[fol. 15717]

Exhibit X-41 (transcript page 14,166).
" X-42 (transcript page 14,167).
" X-43 (transcript page 14,168).
" X-44 (transcript page 14,169).
" X-45 (transcript page 14,170).
" X-46 (transcript page 14,171).
" X-47 (transcript page 14,172).
" X-48 (transcript page 14,176).
" X-49 (transcript pages 14,177-14,179).
" X49½ (transcript pages 14,180-14,182).
" X-49-A (transcript page 14,183).
" X-50 (transcript pages 14,184-14,186).
" X-50-A (transcript pages 14,187-14,188).
" X-55 (transcript pages 14,189-14,190).
" X-67 (transcript page 14,191).
" X-69 (transcript page 14,191).
" X-70 (transcript page 14,192).
" X-71 (transcript page 14,192).
" X-72 (transcript page 14,193).
" X-73 (transcript page 14,193).
" X-74-A (transcript pages 14,194-14,202).
" X-75 (transcript page 14,202).
" X-79 (transcript pages 14,220-14,221).
" X-80 (transcript page 14,222).
" X-81 (transcript page 14,223).
" X-82 (transcript page 14,223).
" X-83 (transcript page 14,224).
" X-83-A (transcript page 14,225).

[fol. 15718]

Exhibit X-88 (transcript page 14,226).
" X-89 (transcript pages 14,227-14,228).
" X-90 (transcript page 14,229).
" X-91 (transcript page 14,230).
" X-92 (transcript pages 14,231-14,248).
" X-93 (transcript pages 14,249-14,251).
" X-94 (transcript pages 14,252-14,265).
" X-95 (transcript pages 14,265-14,266).
" X-96 (transcript page 14,267).
" X-97 (transcript page 14,268).

Exhibit X-99 (transcript page 14,269).
" X-100, printing only the first page (transcript page 14,270).
" X-109 (transcript page 14,297).
" X-110 (transcript pages 14,297-14,298).
" X-111 (transcript page 14,299).
" X-112 (transcript page 14,300).
" X-121 (transcript page 14,301).
" X-148 (transcript page 14,302).
" X-192 (transcript page 14,303).
" X-193 (transcript pages 14,304-14,307).
" X-207, printing only transcript pages 14,327 and 14,340, inclusive.
" X-208, printing only transcript pages 14,346 and 14,352, inclusive.
" X-211 (transcript pages 14,353-14,355).
" X-217 (transcript pages 14,355-14,359).
" X-225 (transcript page 14,380).
" X-227 (transcript page 14,381).
" X-228 (transcript page 14,382).

[fol. 15719]

Exhibit X-229 (transcript page 14,383).
" X-231 (transcript page 14,384).
" X-232 (transcript pages 14,385-14,385A).
" X-233 (transcript page 14,386).
" X-234 (transcript page 14,387).
" X-235 (transcript pages 14,388-14,390).
" X-236 (transcript page 14,391).
" X-237 (transcript pages 14,392-14,395).
" X-238 (transcript page 14,396).
" X-239 (transcript pages 14,397-14,400).
" X-240 (transcript page 14,401).
" X-241 (transcript pages 14,402-14,406).
" X-242 (transcript page 14,407).
" X-243 (transcript pages 14,408-14,412).
" X-244 (transcript page 14,413).
" X-245 (transcript page 14,414).
" X-246 (transcript page 14,415).
" X-247 (transcript pages 14,416-14,417).
" X-248 (transcript page 14,418).
" X-249 (transcript pages 14,419-14,420).
" X-250 (transcript page 14,421).
" X-251 (transcript pages 14,422-14,424).

Exhibit X-258 (transcript page 14,436).
" X-259 (transcript pages 14,436-14,437).
" X-260 (transcript page 14,438).
" X-261, printing only transcript pages 14,439-14,441 inclusive.
" X-262, printing only transcript pages 14,543 and 14,544.
" X-294 (transcript page 14,567).
" X-295 (transcript pages 14,568-14,572).

[fol. 15720]

Exhibit X-316 (transcript page 14,588).
" X-321 (transcript page 14,601-14,602).
" X-343 (transcript page 14,611).
" X-365 (transcript pages 14,726-14,732).
" X-367 (transcript pages 14,732-14,735).
" X-370 (transcript pages 14,739-14,741).
" X-371 (transcript page 14,742).
" X-374 (transcript pages 14,762-14,764).
" X-375 (transcript pages 14,764-14,766).
" X-378 (transcript pages 14,766-14,777).
" X-379 (transcript pages 14,777-14,781).
" X-380 (transcript pages 14,781-14,786).
" X-381 (transcript pages 14,786-14,791).
" X-382 (transcript pages 14,791-14,792).
" X-383 (transcript pages 14,792-14,803).
" X-385 (transcript pages 14,803-14,810).
" X-386 (transcript pages 14,810-14,816).
" X-388 (transcript pages 14,817-14,821).
" X-393 (transcript pages 14,843-14,851).
" X-394 (transcript pages 14,851-14,852).
" X-397 (transcript pages 14,853-14,854).
" X-398 (transcript pages 14,854-14,865).
" X-433 (transcript pages 14,921-14,922).
" X-434 (transcript pages 14,922-14,924).

[fol. 15721] Include also in said printing the following deposition exhibits from said Chicago case:

4 (transcript pages 14,945-14,951).
5 (transcript page 14,952).
6 (transcript page 14,953).
7 (transcript pages 14,954-14,966).
8 (transcript pages 14,967-14,969).
26 (transcript pages 14,999-15,000).

50 (transcript pages, 15,094-15,102).
77 (transcript pages 15,123-15,124).
119 (transcript pages 15,146-15,147).
134 (transcript page 15,161).
139 (transcript pages 15,161-15,163).
142 (transcript pages 15,164-15,164 A).
146 (transcript pages 15,165-15,166).
149 (transcript pages 15,166-15,167).
152 (transcript page 15,167).
155 (transcript page 15,168).
158 (transcript page 15,169).
161 (transcript page 15,170).
164 (transcript page 15,171).
169 (transcript page 15,172).
170 (transcript page 15,173).
173 (transcript page 15,174).
176 (transcript page 15,175).
179 (transcript page 15,176).
189 (transcript pages 15,179-15,180).
[fol. 15722] 190 (transcript page 15,180).
190 (transcript page 15,180).
193 (transcript pages 15,274-15,275).
195 (transcript page 15,276).
196 (transcript pages 15,276-15,278).
197 (transcript page 15,279).
205 (transcript pages 15,284-15,291).

(42) Include also in said printing the following exhibits from the so-called toll case, otherwise known as Advanced Utility Rate Proceeding, No. 124:

Cox Exhibit 10 (transcript pages 15,292-15,296).
Cox Exhibit 11 (transcript page 15,297).
Cox Exhibit 12 (transcript page 15,298).
Cox Exhibit 13 (transcript pages 15,299-15,303).
Cox Exhibit 14 (transcript pages 15,304-15,308).
Cox Exhibit 15 (transcript pages 15,309-15,313).
Crunden Exhibit 2 (transcript page 15,314).
Crunden Exhibit 11 (transcript pages 15,315-15,322).
Crunden Exhibit 12 (transcript page 15,323).
Kositzky Exhibit 2 (transcript pages 15,324-15,467).
Kositzky Exhibit 13 (transcript pages 15,468-15,537).
Kositzky Exhibit 26 (transcript page 15,538).
Kositzky Exhibit 28 (transcript page 15,539).

Kositzky Exhibit 30 (transcript page 15,540).
Kositzky Exhibit 31 (transcript page 15,541).
[fol. 15723] Kositzky Exhibit 32 (transcript page 15,542)
Kositzky Exhibit 33 (transcript page 15,543).
Rhodes Exhibit 3 (transcript page 15,544).
Rhodes Exhibit 83 (transcript page 15,545).
Rhodes Exhibit 84 (transcript pages 15,546-15,590).
Rhodes Exhibit 87 (transcript pages 15,591-15,609).
Rhodes Exhibit 88 (transcript pages 15,610-15,621).

(43) Include also in said printing the following exhibi from the so-called "Service Connection Charge C se," being cause No. 1728 on the docket of said Commiss on a consolidated into said company-wide case No. 3307:

Cooper Exhibit 6 (transcript page 15,671).
Cooper Exhibit 9 (transcript page 15,672).
Cooper Exhibit 10 (transcript page 15,673).
Cooper Exhibit 11 (transcript page 15,674).
Cooper Exhibit 12 (transcript page 15,675).
Cooper Exhibit 13 (transcript page 15,676).

Karl E. Burr, W. H. Thompson, W. B. Stewa Ashley M. Van Duzer, Thomas V. Koykka, A torneys for Appellant.

Service of the foregoing and receipt of a copy thereof Columbus, Ohio, this 18th day of November, 1936 are here acknowledged.

John W. Bricker, Attorney General of Ohio; Don C. Power, Attorneys for Appellee. The Pub Utilities Commission of Ohio, by E. J. Hopp Chairman.

[fol. 15724] [File endorsement omitted.]

Endorsed on cover: File No. 41,079. Ohio Supre Court. Term No. 539. The Ohio Bell Telephone Compa appellant, vs. The Public Utilities Commission of Oh Filed November 20, 1936. Term No. 539, O. T., 1936.